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47. 439.

THE DOUBLE GAUGE RAILWAY SYSTEM.

DANGER TO TRAVELLERS

AND

INJURY TO SHAREHOLDERS,

THREATENED BY

A COMBINATION

OF THE

BROAD AND NARROW GAUGES.

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PROVED BY THE EVIDENCE OF

STEPHENSON, LOCKE, AND BRUNEL.

By SAMUEL SIDNEY,

AUTHOR OF "THE RAILWAY SYSTEM ILLUSTRATED," &c. &c.

> "Ce n'est pas seulement le courage, et l'intelligence, et l'activité,—c'est la sagesse et l'économie qui maintiennent la superiorité des productions et du commerce de son pays."—CHARLES DUPIN'S *Force Commerciale de la Grande Bretagne.*

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INTRODUCTION.

In my pamphlet entitled "Speed on Railways Considered in a Commercial Point of View," I tried to show the heavy tax paid for the only successful part of the Broad Gauge system—Express Trains. In the following essay, I have collected all the evidence extant on the Double Gauge—a new and expensive addition, which our Parliament is taking every possible opportunity of adding to the already sufficiently expensive Broad Gauge system.

I do not claim any part with those philanthropists—like Mr. Morrison—the Robin Hoods of Railway Reform who propose, with cheap generosity, to commence robbing Railway Companies in order to bestow alms on Railway travellers. I believe that the best interests of the public are identified with the prosperity of these great carrying corporations: but I think it part of the duty of a wise Government not to permit public works to be constructed for the sole advantage of an exclusive class. To illustrate my meaning, I think daily trains for passengers, at ½*d.* a mile, a hundredfold more useful to the country than an increase of speed, which to the traveller paying 3*d.* would save a mile an hour in a journey of 200 miles. I think that to introduce into our agricultural districts, which will so soon be called upon to sustain a fearful competition with more fertile corn-growing countries, conveyance for their labour, and their produce, and their supplies, at as cheap a rate as in the North (where coal is conveyed at nine miles an hour for ½*d.* a ton), would be a practical boon, far outweighing the most luxurious Great Western Express, and far easier to attain than the re-enactment of Protection, or the repeal of the Malt-Tax. I have endeavoured to show how, led astray by the fallacious expectations held out by the promoters of the Broad Gauge, we have advanced from one extravagance to another, until we find ourselves gravely contemplating an addition to our Railway system, which, without affording one single new advantage, must cost an additional 6,000*l.* a mile, and may cost 20,000*l.* a mile, engulphing at one fell swoop the simplicity, safety, economy, and efficiency, and, like a compromise at the end of a Chancery suit, leaving the shells for the shareholders and the public, while the lawyers and the engineers divide the oyster.

While these pages were passing through the press, a frightful accident, on the London and North-Western Railway, by which ten persons have lost their lives, has afforded melancholy proof of the "danger," which forms a leading feature in my title-page. A signal-man, labouring under some strange infatuation, turned the switches out of the main line into a siding, and sent a mail train, moving at a rapid rate, against a luggage train (*Times*, June 7).—Under the Mixed Gauge system, I have clearly proved that the probability of such accidents will be doubled, trebled, and even quadrupled.

The Cheltenham and Oxford line must be added to the list of those (provisionally) sanctioned on the Mixed Gauge system; and several of the projected Lines, given in my list, have been defeated. But these variations do not affect my conclusions.

Our legislators seem to be of opinion—contrary to the Reports of all Special Reports on the subject—that the public have nothing whatever to do with the cost of Railways; and this idea, *combined with the natural taste of amateur judges for anything in the shape of a compromise*, will probably continue to make the Mixed Gauge a favourite mode of settling Gauge contests, until some fearful calamity, in which a member of either House of Parliament loses life or limb; or the extravagant waste of capital consequent on grafting a

Broad Gauge line with a Narrow Gauge line, reduces the dividends of a promising speculation to zero, and devours the income of individuals sufficiently well connected to be pitied in their poverty by ministers of state.

Some persons may consider that I have expressed my opinion of the policy of the Great Western Company, and of the unscrupulous manner in which that policy has been forwarded by the chiefs and officers of that Company, in terms more plain than courteous. If it be so, I have a double justification. My proofs, from the recorded words of the parties arraigned, have preceded my conclusions; and the parties themselves have, in Parliament, at public meetings, and in print, spared no calumnious imputations and epithets, when it has been their interest to disparage either railway opponents or official arbitrators, not inclined to put implicit trust in the dissolving views of Mr. Brunel, and the poetical promises of Mr. Charles Alexander Saunders. It is scarcely twelve months since, at all Broad Gauge meetings, and in all Broad Gauge prints, Professors Airy and Barlow, and Sir F. Smith were held up as ignorant, garblers of evidence, and unjust and corrupt judges.

Mr. Saunders never makes his appearance as a witness without giving the Committee to understand, that the Company he so zealously and ably represents is entirely actuated by public-spirited motives, quite independent of dividends, or anything connected with profits, and that the Company opposed to him is the incarnation of all that is selfish and money-grubbing; while every one who travels on, or sends goods by, the Great Western Railway knows that, except to first-class passengers and freighters of large cargoes of goods, the tariff of Broad Gauge Lines has hitherto been most oppressive; the conduct of all officials connected with it arbitrary and vexatious. It is, in fact, a gentleman's, not a poor man's railway; but by dint of praising themselves, libelling their opponents, and making most brilliant promises, the Great Western Company have put their Narrow Gauge party to the route.

In promises, no one can equal the advocates of the Broad Gauge, *now the only man who could is dead, and his mighty sham with him;* but if our legislators were not wilfully blind they could not fail to see that after promising for nine years, and having the command of unlimited millions, unparalleled parliamentary success, the advantage of large loans borrowed at a cheap rate,—of seventy-five miles leased at a low rent, the Broad Gauge has levied higher rates, afforded less accommodation to the carrier, the miner, and the farmer, and paid a lower dividend than the South-Western Narrow Gauge, which traverses so poor a district. Where, then, are the promised advantages of the Broad Gauge? The disadvantages, — the eagerly adopted Double Gauge, at from 6,000*l.* to 10,000*l.* a mile, and double danger, well illustrates.

How long will the public permit itself to be dazzled by these brilliant charlatans dancing so gracefully, while we pay the piper? The last Parliamentary "dodge" admirably exhibits the Parliamentary abilities of the Broad Gauge party. Other Railway Companies have been working at low rates for years without fuss or puffing, the Great Western, being compelled by Parliamentary regulations to reduce its tariff on making amalgamations with a new rich territory, in great form and state introduces a Bill to do that, as though willingly, which competition and Parliamentary regulations render absolutely necessary, and, at the same time, takes power to make *capital of premiums paid* for the Birmingham and Oxford Junction Railway. Where are the protests of Messrs. Edward Ellice, Morrison & Co.? Dexterous canvassing has enabled one Company to steal the horse, woe to any other that dare look over the hedge!

S. S.

Westminster, June 1847.

THE DOUBLE GAUGE RAILWAY SYSTEM.

"One of the essential features of a Railway is extreme simplicity. When you begin to multiply the mechanical apparatus, you render it a less perfect machine."—*Robert Stephenson.*

Next to our race of energetic and ingenious men—next to our treasures of coal and of iron—nothing has contributed more to the successful rivalry in commerce, and all the arts of peace and war, which this small island has maintained with great European States, blessed with a more favourable climate and more fertile soil, than our excellent means, natural and artificial, of internal communication—what Baron Charles Dupin has so happily called our *pouvoir viable*,—while the sea around us forms an easy highway from north to south, from east to west.

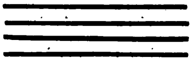
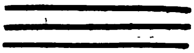
Roads, rivers rendered navigable, canals, and railroads (the last discovered and most perfect means of reducing time and space), not only give increased value to our fields and our mines, but actually create wealth as much as if they struck on veins of gold and diamonds: for means of easy conveyance open the long neglected coal-mine, give fuel to the shivering peasantry, employment to the miner, and unlooked-for revenue to the landed proprietor—easy means of conveyance bring lime and manure to be laid down on the reclaimed heath, which, in return, gives back hay and corn, turnips, milk, cream, butter, cheese, and fat cattle, to be also conveyed to the markets the new roads have opened. The amount of this interchange must depend on the price of transport. A hard turnpike-road made that point near, which was out of all reach when pack-horses on bridle-roads were the only means of transport. The canal still more reduced the distance and expense for certain articles; the railroad, most of all, and best of all, was open to everything which it would be useful to transport, from an ox to a load of manure. Cheap as railroads are, they would be more useful if they were cheaper.

At first sight, this would seem a truism so obvious, that to prove it no long array of facts and arguments, drawn from the stores of Parliamentary Reports, was required; and yet in this year of 1847, in the seventeenth session of Railway experience, at this moment, great and constantly increasing efforts are being made to saddle the country with an addition, or rather excrescence, on our present Railway system, which will not only swallow up all the economies of construction which experience has effected up to the present time, but also render Railway communication expensive, inefficient, and unsafe.

There can be no doubt that capital unnecessarily expended on a Canal or Railroad must become a tax upon the public either in increased charges or diminished accommodation. Thus if, from any cause, a Railroad costs 1,000,000*l.*, which might have been constructed quite as well for 500,000*l.*—either, travellers must pay higher charges, or the speculative investment will prove unremunerative, and the road and machinery will fall into decay and disorder,—or the Company will be prevented from extending to other and perhaps less wealthy districts the benefits of locomotive communication. Experience has proved again and again, that Railways which are not remunerative will not long be either efficient or safe. In this country the great streams of commerce are already secured by our principal trunk lines; the districts which remain open for railway projects, are agricultural, rich rather in latent than in existing traffic; which, if they are to be well served, must be cheaply served. Therefore the completion of an effective railway system—that is to say, a system which shall base its success on the many—which shall fill the place, not only of the ship and stage-coach, but of the carrier's cart—must depend on economical construction and economical management.

In the present Session, projects have been brought before Parliament, backed by the influence of the Great Western Company, based upon a novel engineering principle, which, if successful in securing legislative sanction, will occasion an enormous waste of capital, an incalculable increase to the danger of Railway travelling, without securing any advantage whatever to the public at large. This novel principle is beginning to be known as the

Double or Mixed Gauge.

The theory of a Double or Mixed Gauge consists in rendering a Railway capable of accommodating indifferently the engines and carriages of either the Broad or the Narrow Gauge. In the DOUBLE GAUGE this would be done by laying down two Narrow Gauge rails within each pair of Broad Gauge rails, thus  In the Mixed Gauge a third rail is proposed to be added to each pair of rails, whether Broad or Narrow, thus  It is a system which has never been tried, except experimentally; but it is about to be laid down on 100 miles of road, between Worcester and Wolverhampton, and Oxford and Rugby, in all about 100 miles (under powers obtained last Session, under circumstances which will presently be explained); and a great effort is being made to extend the Mixed Gauge on for a further 140 miles, in the course of the present Session, without waiting to see the result on the 100 miles already sanctioned.

Now, as Mr. Brunel himself, the author and sole patron of the Broad Gauge and the Mixed Gauge, admits that the latter will occasion a very considerable increase in the expenses of the lines on which it is adopted; and as Messrs. Stephenson, Locke, and other engineers of equal eminence, are of opinion that its cost will largely exceed Mr. Brunel's estimate, while it will introduce an incalculable amount of expense and danger in the working of our Railway system —it may be worth while to inquire,

1st. What led to the invention of a Mixed Gauge?

2nd. What Mr. Brunel thinks of it?

3rd. What other engineers think of it?

4th. Whether the balance of evidence on this point lies with Mr. Brunel, or with Mr. Robert Stephenson and the host of Civil Engineers who follow in his footsteps?

The Origin of the Complicated or Mixed Gauge.

When Mr. Brunel first proposed to deviate from the standard which by universal consent had been adopted for the breadth between the rails of railroads, he defended the alteration by declaring that the district on which he was about to lay down his 7-feet gauge, could never by any possibility have any close connexion with the rest of England; and that therefore the interruption, which he then admitted would occur wherever the 7 feet and the 4 feet 8½-inch gauges met, would be almost inappreciable. This was a very excusable error—many eminent persons were of the same opinion, although George Stephenson and his son, Robert, more far-seeing, always contemplated the time when railroads would supersede turnpike roads, and therefore invariably employed the gauge with which they started.

The 7-feet, or exceptional gauge, was opened between London and Exeter for public traffic in 1842, but it was not until 1844 that the opening of the Bristol and Gloucester on the same gauge, communicating at Gloucester with the Birmingham and Gloucester (which was on the ordinary gauge) afforded means of testing practically the difficulties attendant on transporting traffic across the obstacle technically termed a" Break of Gauge."

But very early in the history of English Railways a difficulty of a somewhat similar kind occurred, and attracted the general attention of Parliament.

The difficulty was this—in the infancy of railways, the managers were unwilling to trust their carriages, trucks, waggons, and all that is comprised in the term "stock" out of the hands of their servants. The consequence was, that passengers were constantly compelled to exchange carriages several times in the course of long journeys, and even merchandise was unloaded and reloaded, more than once.

The inconvenience of this arrangement, as regarded passengers, was brought before the Select Committee of the House of Commons on Railways which sat in 1839; and the result was, that, from the publicity given to the grievance by that means, and by means of one of an

Englishman's unenacted but most valuable privileges, letters to the newspapers, it was, in a great measure, abandoned on the principal lines of road. Eventually a system of tollage was adopted for all sorts of vehicles, which, with the aid of the Railway Clearing-house arrangements, enabled "stock" of all descriptions, whether loaded with goods or passengers, to be sent to the furthest parts of the kingdom, over lines the property of different companies.* Indeed, under the Railway Clearing-house arrangements, whenever, by means of a bridge over the Thames, a communication shall be effected, as it eventually will be, between the lines branching from Euston-square and those commencing on the south side of that river, there will be nothing to prevent a coach-load of foreign princes or a ton of cochineal from being forwarded, without transshipment (transcarriagement would be a more correct term) from Southampton to John o' Groat's House, if railways should be lengthened out so far.

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* On the 2nd January 1842, the system of the Railway Clearing-house came into operation on the railways extending from London to Darlington in one direction, and from Manchester to Hull in another. It was adopted, at subsequent periods, by the companies whose railways extend from Darlington to Carlisle, Sunderland, Hartlepool, and Scarborough; and from Birmingham to Gloucester, Birkenhead, Liverpool, Fleetwood, Lancaster, and Manchester. In a few months it will be in force on all the Narrow Gauge railways in Great Britain lying north of the Thames. * * * The main principles of the system thus widely diffused are—1st. That passengers shall be booked through at all principal stations, and conveyed to their destination without change of carriage; that horses and cattle shall likewise be sent through without change of conveyance; and that goods shall in the same way be carried through without being *shifted* or reassorted. 2ndly, That companies respectively shall pay a fixed rate per mile for such carriages and waggons, not their own property, as they may use; and a further sum per day, by way of fine or demurrage, for detention, if kept beyond a prescribed length of time: vehicles of various descriptions were in this way exchanged during six months in 1845—*Origin and Results of the Clearing System, by* K. MORRISON, *manager of the Railway Clearing-house.*

Of course, at Gloucester, there could be no mutual accommodation between the abutting lines, because at the extremities of the Narrow Gauge and the Broad Gauge the carriages run into a mechanical *cul de sac*, nor could there be until some contrivance was perfected by which carriages on axles 7 feet wide could be reduced to fit roads only 4 feet 8½ broad, and by which axles only 4 feet 8½ inches could be elongated so as to fit railways 7 feet wide, or until by some other ingenious plan, the loads of the one system could be transferred to the other without transhipment. Pending so desirable an invention, passengers were made to tranship themselves, while porters unloaded and repacked all luggage, baggage, and merchandise. Live cattle, especially pigs, were occasionally puzzlers.

When, therefore, in 1845, Mr. Brunel entirely threw overboard the isolating policy and theory of railway districts on the strength of which he obtained permission to lay down his exceptional gauge, and brought before the Committee of the House of Commons his plans for uniting the West of England with the Midland and Northern Counties by the lines since passed into law as the Oxford, Worcester, and Wolverhampton, and the Oxford and Rugby — he was armed at all points with plans for overcoming the breaks of gauge which he proposed to introduce. He spoke with the greatest possible confidence of the ease with which diversity of gauge could be reduced to a merely nominal evil, viz.:— by means of an hydraulic machine,—by telescopic axles,— by means of trucks with shifting bodies and wheels,—of low trucks for carrying Narrow Gauge carriages bodily,—

and by the *double gauge;* of which last, however, he was then prepared to make use in special cases only.

It is well known that Mr. Brunel is not only an engineer of amazing fertility of invention and practical skill, but also one of the best witnesses—the most ready and plausible—that ever went into a box. It is not, therefore, at all extraordinary that the committee put more faith in what he said could be, than what Mr. R. Stephenson, Mr. Locke, Mr. N. Wood, Mr. W. Harding, and a host of others as firmly declared could not be (*profitably*) done. So many extraordinary triumphs in mechanics have been effected in the nineteenth century, that gentlemen legislators may be justified in putting faith in the possibility of anything: indeed, if Mr. Brunel to-morrow undertook to produce perpetual motion, he would probably find parties to sanction the undertaking. For he has proved that he can not only talk well, but act well. The worst of it is, that his acts are so very expensive.

Before the gauge commissioners, Mr. Brunel repeated his firm conviction that by some means or other he would all but entirely obviate the inconveniences, if any, of diversity of gauge; although, when hard pressed, he owned, by implication, that he was not prepared with any specific for transporting goods across a Break of Gauge. For instance:—

Quest. 4042.—Supposing a break of Gauge to take place at Rugby, how would you propose to arrange for your passengers and goods generally?

Ans.—Passengers, I suppose, would be treated in the same way we now treat them at Didcot, viz., *made to change carriages.*

Quest.—Having dealt with the passengers, *and having had now some considerable time to think of the question of goods since it was brought forward in the last session of Parliament*, have you made up your mind at all as to the mode in which you would arrange respecting them?

Ans.—No; because it must depend upon what the other companies chose to do on the other side: if they do not afford assistance to exchange, the mode must be different from what it would be if they did!

The commissioners examined *seriatim*, all Mr. Brunel's hints—they could scarcely be called plans—for that end, and rejected them all on the ground that either they had been tried and found wanting, or that they were too dangerous and too expensive.

Mr. Brunel is often led into error by the zeal of his friends, as when before the Oxford, Worcester, and Wolverhampton Committee, and before the Gauge Commissioners, he represented that the system of conveying coal in loose boxes was in active operation; with complete success, on the Bristol and Exeter Railway; and Mr. Seymour Clarke, Great Western Superintendent at Bristol, made the same assertion before the Gauge Commissioners; but on examination, it turned out that, in this instance, as in a number cited by Mr. Robert Stephenson, the plan had proved a complete failure. Mr. Brunel was called to prove that Mr. Stephenson's objections to the loose box system were futile, and the following is his evidence, verbatim:—

6799. Do you know instances in which similar mechanical contrivances have been applied to similar purposes?

Mr. Brunel.—Yes; on the Bristol and Exeter line we carry on a large coal trade, entirely in boxes, which come from the vessels and are lifted on the platforms of our vessels; which is done, not by the Company, but by the coal merchants, who have a large business there upon the line; and I see no difficulty resulting from it; and the mechanical arrangements of such a thing, if it come upon our line, is easily conceived as soon as necessary. I do not understand the difficulty which has been supposed to exist.

Mr. R. Down, contractor on the Bristol and Exeter

Railway, was called before the Gauge Commissioners, in answer to Mr. Seymour Clarke's assertion of Mr. Brunel's illustration :—

6295. Have you any experience as to the system of moving coals in loose boxes?

Ans.—At the next wharf, about 3½ miles from me, the West of England Company have loose boxes. We are 45 miles from Exeter, and they are 48½.

6299. The other Company to which you alluded attempted the use of loose boxes?

Yes; but that was not to move from one gauge to another, it was to send over to Newport and get the coal put into those loose boxes and lift them into the vessel, and lift them out again. They thought they should prevent the coal from being broken, but they had to come into the river without any quay walls—a dirty muddy river; and they had to lift those boxes out of the vessel into barges to come through those locks, and lift those boxes again by a crane from the barges to the trucks; and they found it so troublesome that they *have abandoned them.*

But with the exception of the plan of the Double Gauge (which has to a certain extent received the sanction of our government authorities, and other people who ought to have known better), it is not necessary in this chapter to examine any of the *paper* expedients by which members of parliament were bamboozled into believing that the transfer of a million tons of coals, and 1000 passengers from one gauge to another, would cost no more time or money, than the cross travelling of trucks and carriages which takes place daily at Derby, under an arrangement by which, at the same hour, London carriages and trucks go into Newcastle, while Newcastle stock may be forwarded into London and Manchester. For the best of all reasons, the *shifting trucks, the telescope axles*, the *hydraulic hocus-pocus*, &c. &c., have all been abandoned in favour of the last discovered secret—the Double Gauge. They produced their effect, and are now heard of no more.

The Double Gauge scheme originated in 1845, when the Great Western Company were competitors with Broad Gauge lines, against the London and Birmingham with Narrow Gauge lines, for the possession of the country between Oxford and Wolverhampton, and Oxford and Rugby.

The line from Wolverhampton to Worcester, through a great part of its route, intersects a rich mineral country, where the local traffic of waggons over the tramways of mine proprietors is considerable. In order to accommodate this traffic fully, the London and Birmingham Company, by their scheme, proposed to lay down through all the mineral district, a quadruple set of rails, two of which should be devoted to the main thorough stream of traffic, and two to the mineral waggons employed in local traffic, which by this arrangement might be accommodated at convenient points without interrupting the thorough transit, until such places and hours as it should be convenient to turn them on to the main line to be conveyed to their destination. These mineral railways are all on the Narrow or National Gauge, and likely so to remain; the Broad Gauge being entirely unsuitable from the space it occupies, and the unwieldiness of its carriages for mining operations. To meet and beat this plan, Mr. Brunel offered to give the same Narrow Gauge lines for mineral traffic, and also, if required, *a narrow line within the broad.*

In this the first Gauge contest, it was the object of the Great Western to outbid the London and Birmingham by showing what a simple and convenient arrangement the construction of a Double Gauge between Worcester and Wolverhampton would be.

Mr. Brunel then spoke of the Double or Mixed Gauge in the following terms :—

9723. Would there be any difficulty in laying down two sets of rails upon one and the same line of rail?

It is a question of expense, and if worked under the same company, I see no difficulty whatever in it. The rails might either be laid a third rail to each two, or two complete rails, making a complete narrow. I do not recollect. I do not think I contemplated running trains mixed of broad and narrow carriages. I proposed *to run* distinct trains of the Narrow or Wide Gauge carriages, just as we now run stoppage trains, goods trains, and cattle trains.

9744. Adopting either of the ways, either of having one rail in addition, and keeping the trains separate in running distinctly on the Narrow Gauge, or having a distinct set of rails; so having a set of rails within the Broad, there would be no practical inconvenience or danger whatever from the two rails?

I cannot see any.

9745. Have you turned all the powers of your mind to the subject, with the view of seeing practically how it could be carried into operation?

I have thought of it a good deal, having to lay a piece of line that way, between Cheltenham and Gloucester, under the act of parliament, several years ago; and I have also laid it below Cheltenham and Gloucester Railway, — Narrow for the Birmingham and Gloucester, and Wide for the Great Western.

9751. Is there any other instance in which you know of its being done?

There is a small one on the West London Railway, worked jointly by the London and Birmingham, and Great Western.

9756. The line has been laid out not to illustrate your theory, but for practical uses?

I believe the rails were laid down by Mr. Stephenson; he was engineer at the time they were required to be laid down by arrangement, or act of parliament.

With the assistance of Mr. Cubitt, Mr. Brunel succeeded in making the Committees on these Bills believe, that by laying down a Double Gauge, he not only entirely overcame the difficulties of the break of Gauge, but provided for public use a mode of conveyance infinitely superior to either the Broad or the Narrow Gauge alone. It is doubtful whether he expected to be taken at his word.

The Great Western were victorious, and the Oxford, Worcester, and Wolverhampton, and Oxford and Rugby Bills, were passed subject to the measures which Government might choose to adopt with respect to the Gauge Question, and with provisoes that, in any event, the Board of Trade should have power to enforce the laying down of a Narrow Gauge line between Oxford and Rugby, and between Worcester and Wolverhampton.

The Gauge Commissioners, it is well known, reported against the Broad Gauge; and it is a remarkable fact, that in the elaborate document published by the Great Western Company, for the purpose of neutralising the effects of the Gauge Report, while page after page was devoted to proving that by some one of several mechanical means the evils of the break of Gauge could be reduced to a scarcely appreciable expenditure of time and money, the Double Gauge expedient was passed by almost unnoticed. When the Report of the Gauge Commissioners came to be fitted to the Parliamentary exigencies of Sir Robert Peel's dying and Lord John Russell's new-born Ministry, large concessions were made to the compact and active body which represents the Great Western Company in the two Houses; and in that incomprehensible document known as the Gauge Act, the proprietors of the Oxford, Worcester, and Wolverhampton, and the Oxford and Rugby, were *permitted* to lay down the Broad Gauge, and by the Board of Trade *compelled* to lay down the Narrow Gauge.

From 1845, when Mr. Brunel first outbid the Narrow Gauge party by offering "two single railways rolled into one," until 1847, no one was able to elicit the exact practical plan in which he proposed to carry his Double Railway into execution. His answers on this question exactly resembled those which he invariably makes when his patrons indulge him by allowing him to tackle an expensive *possibility*. Lord Lincoln observed truly, the other day, that "there are no impossibilities to modern engineers except making Railways without money." He said, as he said ten years ago about Maidenhead Bridge—as he said two years ago about the break of Gauge—last year about Hockcrib tunnel, and this year about a twenty-feet cutting through the heart of Cheltenham—that he "could see no difficulty—never could," "it was the simplest thing possible;" but that "he had not made up his mind exactly how he should execute it." He calculated the cost of laying down a third rail on a Double Broad Gauge line at about 2,500*l.* a mile, and a pair of Narrow Gauge rails at about 4500*l.* a mile. The following are his detailed estimates delivered to the Gauge Commissioners:—

ESTIMATE FOR ADDING TWO TIMBERS AND TWO RAILS TO EACH LINE FOR ONE MILE.

	£	*s.*	*d.*
Timber, 320 loads at 85*s.*	1360	0	0
Hardwood, 31 loads at 85*s.*	131	15	0
Rails, 7040 yards at 70 lb., 220 tons at 8*l.* . .	1760	0	0
Joint Plates, 1 ton 2 cwt. at 8*l.*	8	16	0
Screws, 100 gross at 22*s.*	110	0	0
Fancy bolts, 14,200, 19 tons at 14*l.*	266	0	0
Joint Plugs, 1376, at 11*s.* per 100	7	0	0
1760 through bolts, 2½ feet long, with washers 6½ lbs. each, 5 tons 5 cwt. at 14*l.*	73	10	0
Grease, &c.	28	0	0
Laying	300	0	0
Load of materials, about 600 tons	200	0	0
Contingencies	100	0	0
	£4345	1	0

ESTIMATE FOR ADDING ONE TIMBER AND ONE RAIL TO EACH LINE FOR ONE MILE.

	£	*s.*	*d.*
Timber, 160 loads, at 85*s.*	680	0	0
Hardwood, 15½ loads at 85*s.*	64	0	0
Rails, 3520 yards at 70 lb., 110 tons at 8*l.*	880	0	0
Joint Plates, 11 cwt. at 8*s.*	4	8	0
Screws, 50 gross at 22*s.*	55	0	0
Fancy Bolts, 7100, 9 tons 10 cwt. at 14*l.*	133	0	0
Joint Plugs, 688	3	10	0
880 through bolts, 3½ feet × ⅛ inch, with washers, 9 lb. each, 3 tons 10 cwt. at 14*s.*	49	0	0
Grease, creosote, &c.	14	0	0
Laying 200*l.*; load of materials, about 300 tons, 100*l.*	300	0	0
Contingencies	100	0	0
	£2282	18	0

On the Oxford and Rugby, and Worcester and Wolverhampton lines, as well as upon the numerous extensions in various parts of the kingdom, for which the Great Western are seeking powers in the present session, it is understood that Mr. Brunel has determined to adopt the plan indicated in the second estimate—the Mixed Gauge, viz., a third rail within each pair of Broad Gauge rails, making use of the outside rail of the Broad Gauge in common for both Broad and Narrow Gauge trains. It will be seen that a trifling economy is effected by this means, but it combines many more disadvantages than the complete Double Gauge system.—(See p. 3.)

In the present session the Great Western Company have brought forward, amongst other Mixed Gauge projects, some short lines in opposition to Narrow Gauge extensions projected by the Stour Valley Railway, which came under the review of a Committee with Sir James Graham as chairman.

It might be imagined that in two years Mr. Brunel had sufficiently matured his plans to be able to give a clear idea to the Committee and his opponents of what he intended to do. The following is the succinct style in which the Broad Gauge engineer describes the last patent remedy for curing Breaks of Gauge.

Without taking you through the matters of detail, have you any doubt as to the benefit and practicability of the combination of the two systems?

Mr. B.—I never could understand what the difficulty was, or which was supposed to exist.

You are quite clear, as to difficulty there would be none?

I cannot conceive any.

In your opinion, will it be extremely important to have these lines on the Broad and Narrow Gauge?

Yes, decidedly; connected as they are with a line on the Broad and Narrow Gauge, and connecting many districts where there are both Broad and Narrow Lines, it will be an advantage to have both.

Under the searching cross-examination of Mr. Hope, no details of the Mixed Gauge plan could be extracted. The maxim of the raree showman is adopted by the Great Western when they apply for a Bill. Put a shilling in my hat, and you shall see —— what you shall see! Like Falstaff, Mr. Brunel gives "no reasons," either with or without compulsion.

After Mr. Hope had elicited that the Great Western Company had projected 146 miles of Broad Gauge lines beyond the limits assigned by the Gauge Act, of which two-thirds were planned on the Mixed Gauge, the following dialogue took place:—

Practically you contemplate no difficulty in working the Mixed Gauge?

I cannot understand any.

The multiplication of points you think a matter of no importance?

It is of very trifling moment. Of course it is of some moment.

The station arrangements you think would be equally easy?

Yes, I do.

I believe the opinion of the profession, generally is against you on these points?

No. I should say the reverse. All those who are called Narrow Gauge advocates are on the one side, of course. All those who are not mixed up with the party question are of opinion that there is no difficulty.*

Are they to be found, and where?

They have given evidence; *but they are rare, and I confess they are becoming still more rare!*

How do you propose to lay down the rails on the line from Worcester to Wolverhampton?

The Mixed Gauge.

How mixed?

I leave it to the Railway Department of the Board of Trade to decide that.

That is to be determined by some other higher power?

Yes. It is to be decided by the Railway Commissioners.

Did you propose to lay down a separate line?

I think not.

But think again?

It is of no use asking me. If you know it, put it in evidence.

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* This answer is quite unworthy of a man of Mr. Brunel's eminence. He stands alone in all the world as an advocate of the Broad Gauge. The only *Railway* engineers who have given evidence in favour of the Mixed Gauge are Mr. Cubitt and Mr. Vignolles. Both have constructed, and continue to construct, all their lines at home and abroad on the 4 feet 8½ inch Gauge. Mr. Cubitt has a *theoretical* preference for a *uniform* 6-feet Gauge. See his evidence before Select Committee, Lords, 1846. Mr. Vignolles, when called in specially by the Government of Baden to advise on a break of Gauge, recommended the reduction of the 5 feet 3 inch Gauge of that Duchy to the uniform standard of 4 ft. 8½ in. adopted by all the rest of Europe.

I am speaking from my recollection, and appealing to your recollection. You do not remember how you proposed to do it?

No.

This is one of the most extraordinary instances of caution on record. In January last, Mr. Brunel had forwarded a report, with drawings, to the Directors of the Great Western Company, detailing his plans for laying down the Mixed Gauge on the Oxford and Rugby and Worcester and Wolverhampton lines; and at the time he was speaking, at the office of the Railway Commissioners, within 200 yards of the Committee-room, a working model of the Double Gauge, forwarded from the Great Western Engineer's Office, was lying. However, it is a maxim of the laws of England, that no prisoner is bound to criminate himself.

Sir James Graham, Chairman of the Committee, appears not to have been satisfied with Mr. Brunel's *ex cathedra* opinions in favour of the Double Gauge, and, therefore, proceeded to complete the examination, which Mr. Hope had discontinued when met by Mr. Brunel's *non mi ricordo.*

SIR J. GRAHAM—There is no Railway now in operation on the mixed Gauge, is there?

Mr. BRUNEL—No, there is not.

It has never yet been tried?

The Birmingham and Thames Junction is on the mixed Gauge.

Mr. Brunel here again states that the additional cost of the Mixed Gauge, with a third rail, will be about 2,500*l.* He is asked,

Have you a fixed opinion as to the precise mode in which you would sanction to lay it down?

I think it would depend upon the *circumstances of the line, very*

much. There might be cases in which two distinct independent Railroads, the Narrow Gauge inside the two rails of the Broad Gauge; but I do not think, generally speaking, that would be done. *Making the outer rail common to both systems,* and making two inner rails, is the plan submitted to the Railway Commissioners for the Oxford and Rugby Line. In that manner the platforms on the Narrow Gauge Lines are exactly the same distance from the outer rails as they are on the Great Western Railway.

The buffers correspond?

No, that is a different point; but the distance from the platform is exactly the same at all the stations, and the arrangements become exactly the same; and that is the way that I have proposed it to the Railway Commissioners.

And he goes on to state, as usual, that there is not the slightest difficulty in trying either system on any Railway; that curves present no difficulty, and that the Cheltenham and Gloucester Line, six miles in length, will, in a few weeks, be converted from a Narrow Gauge to a Mixed Gauge Line.

Mr. C. A. Saunders, in his examination before the Committee on the proposed Cheltenham and Oxford Railway, admitted that the Mixed Gauge had not been tried practically before, lest an accident should prejudice the Great Western Mixed Gauge bills. In the same way, Mr. Brunel's report to the Board of Trade was made a profound secret, and we are indebted to Sir James Graham for the revivals of Mr. Brunel's memory on a leading feature of his aggressive plans.

Sir J. G.—How do you propose to work trains on the mixed Gauge?

Mr. B.—To work them quite independently. Circumstances might arise which might make it desirable to run mixed trains.

Would you always use your powerful engines?

I should prefer them. *Circumstances might arise which would make it desirable to have other engines.*

There is certainly more of expediency than circumstantiality in such evidence; but the next answer is still more pregnant of loopholes for evasion.

Sir J. G.—Have you included in your estimates the cost of working the proposed mixed line on the Narrow Gauge as well as the Broad Gauge, the engines, carriages, and so forth?

Mr. B.—*We have not made any estimate of working.*

Do you propose to have any plan for the purpose of working the Narrow as well as the Broad Gauge throughout the mixed Gauge?

I take it for granted, that we shall do everything we can to carry traffic on our own line.

We have thus endeavoured to collect Mr. Brunel's opinion on this new scheme, and in spite of the pains taken to conceal the details of a system which will so little bear investigation as the Mixed Gauge, we are enabled to ascertain by a careful examination of all Mr. Brunel has ever said about it, some very important facts. Amongst others, that the Great Western Company are prepared, if permitted, to extend the Double Gauge in all directions; that the mere cost of laying down the Rails, in addition to the expenses of a Broad Gauge line, will be 2,500*l.* per mile; that if used, separate trains of Broad Gauge and Narrow Gauge carriages must be run; and that consequently a double stock of engines and vehicles must be maintained for the use of a Line which, under a uniform Gauge, would be amply accommodated by one set on the one Line.

These are serious objections to the adoption of a plan which no one except the Great Western Company willingly patronises; but more remains behind. The Gloucester and Cheltenham Line, which Mr. Brunel, in 1845, said had long been under his consideration, although held by the Great Western conjointly with a Narrow Gauge Company for many years, with full powers to lay down a Double Gauge, has never been used by the Great Western Company; and no attempt was made to apply the Mixed Gauge as a cure to the Break of Gauge, until a rival Company brought out a direct Narrow Gauge Line from London to Cheltenham. The Mixed Gauge on the Thames Junction Railway—another of Mr. Brunel's illustrations—has never been in more than nominal use by horse power; and at the time Mr. Brunel was giving evidence, arrangements were in progress, as he perfectly well knew, for taking up the Double Gauge and laying down the Broad and Narrow Gauges separately, for the independent use of the London and North-Western and the Great Western.

It is seldom that a good cause or a really practical scheme is supported by such dexterous evidence as this.

What other Engineers think of the Mixed Gauge.

The opinions of a numerous body of Engineers, of European eminence, and the highest practical skill, are adverse to the employment of the Double Gauge. They are of opinion that it will not remove in any material degree the evils of a break of Gauge—that it will necessitate the erection of a double set of stations and other permanent works, and the employment of a double stock of engines and carriages, if the two Gauges are to be really and efficiently worked.—That this increase in the expenses of constructing and working railways will effectually prevent the reduction in the cost of conveyance of passengers, merchandise, and minerals, to which the country has long been anxiously looking.—That Companies by whom the system is adopted, or upon whom it is forced, will be unable *to reduce* their tariff, and to extend their accommodation. And that, in fact, while the accommodation afforded will be single, the expense will be nearly double, and the dangers of railway travelling incalculably increased. They agree in estimating the expenses of changing a Broad Gauge line into a Mixed or Tri-railed line, and putting it into complete working order, at from 6,000*l.* to 10,000*l.* a mile. Of course, the expenses of changing a Narrow Gauge line into a Broad Gauge Tri-rail line would be still greater.

We will commence with Mr. Robert Stephenson, who has given evidence against the Mixed Gauge before the Committees on the Oxford, Worcester, and Wolverhampton Bills, and before the Gauge Commissioners, which appeared in print, and also before several Committees in the course of the present Session. The difference between the testimony of Mr. Robert Stephenson and Mr. Brunel is, that the latter says as little, and as cautiously as possible—the former takes the greatest possible pains to put the tribunal in possession of his views. Mr. Stephenson always looks upon railway projects as commercial speculations, and scarcely ever exceeds in execution the estimate of his project. Mr. Brunel treats railway contests as Napoleon did conquests, with utter indifference as to cost so that he gains the glory of a victory. He has scarcely, if ever, executed a public work within his estimates.

Mr. Robert Stephenson told the Committee on the Oxford, Worcester, and Wolverhampton Railway Bills, that he did not believe that the Mixed Gauge "would work well in practice;" he said,—

> I do not think they can mix the Gauges in stations. Moving the waggons and carriages at stations is done by a series of turn-tables, which enables a great deal of movement to take place in a very small space. That is not the system carried on by the Wide Gauge, because their

turn-tables are so very large, they are very difficult to move. Therefore it will end, in my opinion, in having two stations, one for the Wide Gauge waggons and one for the Narrow Gauge waggons. If you persist in blending them, you must sacrifice the best plan of the one to the best line of the other.

You must have a compromise, in fact?

A compromise which would be productive both of expense in construction and expense in working.

Before the Gauge Commissioners Mr. Stephenson said,—

224. I would observe in passing, that, *if the mixed Gauge system be allowed to extend in this country, the charge upon coal will, in many cases, amount to a prohibition.* I mean that it will charge the coal with a much larger toll if we suppose capital to have an influence on the tolls, which it must either directly or indirectly. *It is all very well to say that the Company has a maximum toll,* and cannot exceed it—a penny a ton—*but they may lower it.* Very few Companies charge their maximum rates, showing that Companies rather tend to lower, to consider what they can carry at a decent profit. But in the case of the mixed Gauge, I pointed out very prominently the consequences of laying down a double Gauge from Oxford to Rugby. *At* 4000*l. a mile, it would be* 200,000*l.*; the interest of that is 10,000*l. a year. That would carry* 60,000 *tons of coal over the whole distance for nothing,* instead of a penny a ton a mile; therefore, whichever way you look, it comes to a commercial question at last. You must have interest for your money; and if the Railway Company were not compelled to lay down that additional Gauge, *they would still be able to pay the proprietors a certain per-centage, and carry* 60,000 *tons of coal for nothing.* Hence it is, that when you are carrying either minerals *or such descriptions of merchandize as corn,* that will not allow of high charges being made, you must consider the expenses of the Line.

Mr. Stephenson's more detailed and matured views on the question, as expressed before Sir James Graham and the Committee on the Stour Valley Railway Committee, in answer to Mr. Brunel's evidence, which has already been given, more appropriately close this chapter.

The next advocate before the Gauge Commissioners for economy and simplicity in railway construction, as opposed to extravagance and complication, is Mr. Wyndham Harding, a civil engineer by profession, and for some time manager of the Bristol and Gloucester Broad Gauge line, which created the break of Gauge, in which capacity he not only saw the working of a system something like the Double Gauge, so far as two stocks were employed, where one on an uniform system would have done the work, but was compelled to turn his attention to expedients for remedying the diversity of Gauge, which was constantly entailing upon him most disagreeable responsibilities:—

4515. Have you at all considered whether inconvenience would result from having a double line of rails upon the same line of Railway?

Yes, I have. There are two ways proposed of doing it, either by using a third rail, as it is called, or by laying a complete Narrow Gauge Railway within the Broad Gauge. *The first way, I think, is hardly worth considering: all persons* who have considered the subject, regard it as what is called a bad job: *the lines would be out of centre:* you could not carry, with any propriety, with one engine, vehicles on the two Gauges by that means.

You might avoid that, might you not?

Not very well; because in the case of accident you want an assistant engine. An engine on one Gauge may break down, and unless you buff together you cannot assist that engine; the next train coming up on the other Gauge cannot assist it. Then at stations you would have to buff. I have myself seen persons killed from the stock not buffing together. We had some of that description on the Glasgow and Greenock: it is most dangerous, and we are obliged to alter the construction of the buffers to make them buff together.

Do you mean that you could not contrive such a system of buffers as to buff together?

Not properly; because you must have new stock to guard against the evil throughout the country.

Where is the objection to the two buffers of the same engine being connected together by a cross buffer, which would buff anything upon the same level?

That is done; but then you must have a cross buffer to all your stock, with spring buffers; that is not easy: the engine has not spring buffers. It could not be done in fact; and if it were not done, the risk would be great, and the stock would be knocked about; therefore I think the three-rail system is not applicable, except to a very small extent, and for a few miles, perhaps. I do not mean to say that it is absolutely impracticable.

Is it not so good, you think, as having a double rail within the other?

No; but there are objections to that. *In the first place it makes the permanent way more difficult to be kept in order.* As a proof of that, I may state that it was tried on the Bristol and Gloucester line by Mr. Brunel; *he was obliged, in consequence of an arrangement with a colliery, to lay a Narrow Gauge line within the* Broad Gauge: *the Narrow Gauge is never used. The contractor for the permanent way asked for an increase of* 50 *per cent. in consequence of the inside rails being in his way; and the demand was sanctioned by Mr. Brunel,* although the inner line was never used; and therefore, no doubt, an inner set of rails are in the way if you want to repair the road, if they remain there permanently. Then, *another principal objection is to the manner in which it increases the number of crossings and intersections of the rail.* I find that where two lines leave or come into two lines, if they are put on one Gauge, there are six crossings; if the double Gauge system is introduced there are 28 crossings, which is apparent by this drawing (*see frontispiece*).

The number which any crossing is to go over is treble?

I am taking the absolute number of crossings now; it would vary under different circumstances. These black lines represent the two Gauges: if you count the crossings of the single Gauge you will find six. Let us take the Broad Gauge, for instance: there are six; whereas if you count the whole number of crossings as it now stands, there are 28 crossings.

However, from the different way in which they are used, I think you will find that each carriage passes over three times?

In some cases it would be, so that may be a fair average; still there is the number of crossings I have mentioned to be passed over by somebody, or something; and thus the crossings are sometimes very dangerous. We nearly had a serious accident on the Bristol and Gloucester, near Gloucester, from a crossing of that sort. There is a place here where it is impossible to introduce a guard, because you would stop up the road: from this cause the engine took the point as it is here, and ran off the road. Those are the principal objections to the Double Gauge arrangements; added to this, which I think more important than all the others, that *you require two stations*, or *two kinds of stock;* unless you have two kinds of stock in one station, you must have two stations. I remember, in Mr. Laing's statistical paper on railways, he stated that the average of the cost of stations per mile on various railways was 3000*l.*, and that has to be added to the 4000*l.* or 5000*l.* per mile which the double cost of the permanent way entails.

Mr. Locke, whose works, both in England and in France, place him in the very first rank as an engineer, who has more than once been opposed to Mr. Stephenson's views, concurred with him entirely in his condemnation of the complicated Gauge. He said,—

To lay down Narrow Gauge rails on a Broad Gauge railroad, so as to carry the Narrow Gauge traffic continuously, is quite possible; *but then it is a very great expense, and wherever two Gauges meet, the station must not only be larger, but of a different construction from what it would necessarily be if it were made for either one Gauge or the other.* The mixture of Gauges would tend to diminish public safety. I would not recommend it. If it were a matter of necessity, I might adopt it. We adopt many things which we should not recommend, from mere matter of necessity; and if it were imperative upon us to take, for a short distance, Narrow Gauge lines upon a Wide Gauge Railway, we should find some means, either by going more slowly or taking precautions in passing over it, without absolute danger; but still I would not recommend working a Line in that way.

Next comes

Mr. J. M'Connell, late Locomotive Manager on the Birmingham and Bristol Broad Gauge and Narrow Gauge Line.

627. What would be the effect of laying down a Narrow Gauge line within the Broad Gauge rails of the Bristol and Gloucester?

I should say that in practice it is *possible* to work the two lines together, and I believe it will be done on a portion of the Line between Cheltenham and Gloucester eventually; but it will be *preferable* to have the lines distinct, to run parallel with each other. Unless the trains are very nicely arranged, and particular care taken in all cases of special trains, it will increase the danger to work the two lines together, as the number of trains running over that portion would be so much increased.

When you speak of working the trains together, you mean different trains?

Yes.

You did not allude to working the different Gauges in the same train?

No; I should not consider that a question to be considered. *Another objection would apply to the points at the crossings: it would complicate it so much; it would render the risk of accidents by engines or carriages getting off the lines greater by having so many crossings. I think it would be preferable to lay down four lines, to put two inside the others; for this reason, that if ever it was thought advisable to work the two Gauges together, they would work better in that way than in the other. I believe that, both as a question of safety and also with reference to the cost of keeping up the plant, it would be better to lay down distinct lines of rails altogether.*

With such evidence derived from the experience of such practical men, it must require greater faith in Mr. Brunel than that eminent gentleman's successes have justified, not to agree with Mr. John Hawkshaw, that the "*Double Gauge is one of those things that nothing but the direst necessity would lead to being attempted at all.*"

These opinions were delivered in 1845, before any lines on the Double Gauge had been sanctioned, and before any case had arisen in which it was necessary for either Mr. R. Stephenson or Mr. Locke to enter into the details of a Mixed Gauge, either for purposes of "*proposition*" or "*opposition*." These necessities have arisen in the present Session, and the following evidence of the two Narrow Gauge Engineers in reply to that of Mr. Brunel on the Stour Valley case affords in its minute circumstantial preciseness, a striking contrast to the vague generalities with which a Broad Gauge Engineer tried to extend the expensive remedy he has discovered for a Break of Gauge, which he once promised to overleap with an "inappreciable expenditure of time and money."

The following is a nearly verbatim report of Mr. Stephenson's examination:—

Now, then, we come to the question of the nature of Gauges set up, of the mixture of Gauges in this district, as being in a great degree that of bringing mineral from South Wales by an unbroken course?

Yes, I think so.

Now, without reference to the question of competition on this subject, do you think that there is anything real in the state of the case, which will justify the introducing of the Broad Gauge into this district, there being this Narrow Gauge communication with South Wales you have described?

No, I do not know what the amount of traffic between South Wales and Staffordshire is: but it ought to be much more important than it is, to justify the mixture of Gauges. I cannot conceive, in a mineral country, anything more dangerous than the mixture of Gauges. I have studied the matter very carefully; and it will involve the country in a very large increased expenditure of money, without giving the public, in my opinion, any additional convenience,—and, certainly, not without involving them in very considerable danger. I am quite aware of the strong opinions of Mr. Brunel; and I and he have discussed this matter together in a friendly way, and he has a very strong opinion one way. I have been brought up a miner; and I know what the difficulties of the mixture of the Gauge are, and the effect of the Break of Gauge. The handling of coal, as I said before, forms a very important element in the cost of production; I cannot conceive anything more disastrous to a coal district than anything like a change of carriage, anything like uncertainty or mixture of systems, or a complication of machinery in conveying them about.

Will you now describe, somewhat more in detail, inconveniences you allude to?

Well, the first practical inconvenience would be that of complexity, and, I believe, great danger. It would not, of course, produce very much danger on Lines where the speeds are very moderate, and where the stations are few, and where the getting-off the Line is a very rare occurrence; but one of the *essential features of a Railway is extreme simplicity;* and when I know that the risk of accident has been so much augmented by points and crossings, in a ratio that will be proved, but for the sake of making my statement consistent, I will state that the proportion of accidents, taking it over several hundred miles of Railway, has been as high as nine to one, where the points of crossing exist, as compared with where they do not exist, and when I know that the mixture of Gauges will multiply those points and crossings more than double—sometimes quadruple them—independently of increasing the expense of the Line at least six thousand pounds a mile, I cannot abstain from declaring the most positive opinion upon it, the responsibility of which I am quite prepared to take under any circumstances.

First, let me ask you if we are to understand from your evidence of the accidents which have occurred on railways, whether a very large portion of them was referrible to points and switches?

Yes; last year the attention of the resident engineer of the Midland lines, which extend over, I think, five or six hundred miles, was drawn to that question.

He is under your control?

It was at my instigation, and the return of accidents which he makes for twelve months, at places where crossings and points have occurred, is as nine to one, compared with those occurring on the plain simple railway.

And unless a railway be broken, you are perfectly safe in passing over it; but in the case of points and switches, you must depend on the vigilance of the men employed?

Yes, and I prefer doing it by hand rather than self-acting machinery; self-acting machinery may meet theoretically the case intended, but it never can be depended upon, particularly when a fall of snow or hard frost has deranged the switches over and over again.

So that you are obliged to have men to manage your switches to begin with, and an additional number of policemen?

Yes.

That, of course, is a matter of considerable expense?

Yes, it is.

In the next place, it is a matter of uncertainty, depending on the attention of the men?

Yes, you have a certain risk to run with men, and they sometimes miss their mark; in fact, one of the worst accidents that ever occurred on the Birmingham line, was from the neglect of a man not turning the switch.

That was a case near the London end?

No; near Coventry.

Is it not the case that intersections of the lines of rails weaken the adjacent parts?

They not only do that, but the break of a rail (which of course is most perfect when continuous,) cannot occur without a jar, and these jars consequently fracture axles, and those axles will proceed for weeks together, and break suddenly afterwards.

Now we come to the question as to how the mixing of the Gauge is to multiply the points. In the first place, I suppose, if you were to have four rails, be they Broad or Narrow, you must in either case double your points if the four rails are running together?

The points themselves you must double; and in the other case they are quadrupled, and more than that sometimes.

We will take first the simple case of a junction of one line with another line?

Yes.

And the occurrence of the points?

At the junction of a railway—that is, a branch passing off. The switches are those which we call points, where the one rail diverges from and does not intersect the other. For the purpose of elucidating, I have had a sketch taken of the Windsor Station on the Great Western Railway, with a view of introducing into it the mixed Gauge, taking the very arrangement that is deemed the best of the Great Western Railway. I thought an objection might arise to not taking a station on any of my own lines; this is a sketch. I do not pretend to precise accuracy, but it sufficiently exemplifies the case. The number of switches in the present station which require attention are eighteen in number, the number of switches that must be introduced on the mixed Gauge is thirty-one; the number of crossings or intersections of the rails are twenty-five at present existing, and the least number required by a mixture will be forty-three. There is another description of crossing which is distinguished among engineers (over crossings), perhaps I had better mix them together. The number of crossings existing is about thirty-seven, I will not be answerable as to one or two, the number that will be required, supposing that thirty-seven be correct, by the mixed Gauge at that one station, will be seventy-seven, and each of those crossings and points cost about *50l.*

(By THE COMMITTEE.)—This is taken from the Windsor Station on the Great Western Line?

Yes, it is.

The Slough Station?

Yes; the Slough Station as it exists: that is merely the application.

How do you mean they cost *50l.* each, the expense of the people to attend them?

No; that is the contract price on the Birmingham line (*50l.* each).

(By MR. HOPE.)—This is on the question of points alone?

On points and crossings.

As you have got into the station, are there other parts of the stational arrangements which the mixture of Gauges complicates very much?

The mixture of the Gauges involve, besides what I have stated, complication and danger. It involves this inconvenience, that if you have a mixed Gauge, you must have a mixed stock of plans of Carriages and Waggons; therefore, when you have got a mixed stock, you must also keep them quite distinct from each other, otherwise they could not be made available for trains running up on the wide or narrow, as the case may be, for either of them may come up — you do not know which—and unless you have your station so arranged, as to get access to any description of carriage, without moving another, very great delay takes place. In fact, I have considered that question, I believe, maturely, and I think by far the better way is to duplicate the stations; that is, to have one station placed at the end of the other, so as to avoid the mixture of carriages which would lead to double the number of switches, and still it would not get rid of the danger which, I maintain, must always attend the breaking of a line of rails.

Besides that, you would require, supposing it was a Narrow Gauge, a different kind of turn-table necessary for the Broad Gauge stock?

You would require a larger turn-table. On a turn-table you cannot have three rails, you must have four rails; you cannot turn a carriage unless it is concentric; three rails for the Narrow Gauge carriage would not be concentric.

So that if you come up the Narrow Gauge on either of the Narrow Lines you get on it side long?

Yes; and when you turn it round the carriage is lopsided; you must have four rails.

And these four rails, supposing you were using the three rails system up to the turn-table, would not be so placed even, if you have four rails they would not meet the carriage to bring it to the centre?

You can adopt another expedient; there is no difficulty that ingenuity will not suggest some remedy for; but practically speaking, the mixture of Gauges *will never be worked for any length of time, it will be tried, and the sooner the better for the country, but it will be abandoned hereafter.*

Supposing the Gauge were mixed in this district, you would have all the inconvenience you mention in the points of the station from the change between the platform and bringing of stock in the station; and also this matter of the turn-tables, now taking it as a mineral district which is to be joined frequently by tram ways from the side, you think that tends to render that still more perplexing?

Yes; still more in the ordinary Branch Railways amongst the mines, as they do not get that attention paid to them which a great public line of railway does; they would be in an extremely bad state. It is increasing the expense to every individual coal owner in getting to the line of railway.

Take the case of a mine owner wishing to lay a Branch into a mixed Gauge system, he would either have to make it one Gauge and encounter a Break of Gauge; if he had to select the other line, he must make it a mixed Gauge also?

He must have two sets of plant, or encounter the Break of Gauge. I should say the Break of Gauge is the least evil of the two.

Let us suppose that the Oxford, Worcester, and Wolverhampton Company get possession of this district with the mixed Gauge; in your opinion would it be at all to their interest to work the narrow part of it?

I really have not considered that question. It would be their interest to work the Broad Gauge more especially than the Narrow, being in connection with the bulk of their district.

And the bulk of their carrying stock?

Yes; and the bulk of their carrying stock: they would find it so burdensome to be involved in a double stock which they would be, that I believe they would abandon it themselves; it would so burthen themselves and the country.

In that case, the Narrow Gauge existing with the Broad Gauge would give no facilities to the Companies who communicate with them in that district in the Narrow Gauge?

None whatever; it would give no facilities—on the contrary, I think the mixture of Gauges a great deal worse than the Break of Gauge; I take it between Worcester and Wolverhampton, it only produces one advantage to the parties in that district, it enables any one to go between those two districts, but to any other point beyond Wolverhampton on the one hand, or Worcester on the other without a change of Gauge, but it does not admit of any one coming beyond Wolverhampton, or beyond Worcester, going to the country beyond *without their having no change of Gauge. In fact, it is nothing more nor less than this dividing the change at Worcester into two parts, half at Wolverhampton, and the other at Worcester, except as regards the Liverpool and Bristol and Liverpool and Oxford, it would multiply the number of Breaks of Gauge in this country; I believe the mixture of Gauges, when fairly considered, will go to aggravate the evil of the Break of Gauge, I can look upon it in no other light.*

Supposing mineral to be brought from South Wales on the Broad Gauge up as far as Stourbridge, that would be an advantage to Derbyshire; would it be an advantage to the country to the East where the Narrow Gauge must be encumbered?

None. If the mixture of Gauges be once considered, I do not see why they should not exist everywhere, because there is an affinity between Staffordshire and Derbyshire. Derbyshire being a new coal field and a rapidly increasing iron producing country they are now sending iron over from Derbyshire into Staffordshire as well as coal, and very shortly, I can see, there will be far more intercourse between Derbyshire, and Staffordshire, and South Wales. Between Derbyshire and Staffordshire the intercourse is rapidly increasing in the raw material, which is more important than the intercourse between Staffordshire and South Wales, which is for the produced material, and which cannot be so important as that which involves the raw material.

So that, practically speaking, the mixture of the Gauges in this district would do nothing in the way of competition in the South Wales district?

Not at all, it is merely an expedient to overcome the difficulty of the Break of Gauge, and I believe, the expedient is worse than the disease.

(By the Committee.)—In working a mixed Gauge, is it contemplated that a Broad Gauge engine may draw a Narrow Gauge train, or a Narrow Gauge engine a Broad Gauge train, reciprocally is that contemplated or not?

I never heard it proposed, that a Narrow Gauge engine should draw a Wide Gauge train; I have heard otherwise, that is, that a Wide Gauge engine might draw a Narrow Gauge train, but that of necessity creates the use of four rails and not three, because then the engine will not be fully in the centre.

Between Cheltenham and Gloucester, which rail is laid down four and three?

I believe Mr. Brunel is laying down three; indeed, I know it, for plans were to be submitted to me on the part of the Midland.

It is three, and not four?

It is three.

The reciprocal use of Narrow and Broad Gauge engines is not possible?

Not as regards the trains themselves.

A double plant and engines must be contemplated?

That is quite clear, a double plant of engines I omitted to add to my former explanation, but when the gauges overlap each other, that although I have admitted that any one residing within the overlap gets rid of the inconvenience of a Break of Gauge, nobody residing beyond the overlap gets any convenience at all, but two Breaks instead of one. That overlap implies the necessity of working double the number of trains and having double the amount of stock. I will mention one case in point, supposing the communication between Liverpool and Bristol, which is very large, and the number of trains arriving at Wolverhampton, may be six in a day, going towards Bristol, and in the opposite direction from Bristol to Liverpool, six more arrive at Cheltenham, where the two Gauges are mixed when they arrive at those points, unless you continue both the Narrow Gauge trains and the Broad Gauge trains for the mixed Gauge line, you do not give the country lying beyond the accommodation of the trains running from that country, therefore it is, as between any point beyond the overlap, double the number of trains running.

And within the overlap of both Gauges, double the number of trains are caused to be worked: that necessitates a double plant of engines?

Precisely, I think it follows; it is double the plant and double the travelling stock.

There is no experience yet of the working of a mixed Gauge?

None, whatever; I have seen it laid down, and I do not deny, that Mr. Brunel puts it very properly for his own case, that the addition of a third rail into a common railway *where there are no stations or intermixture from side to side*, is as plain, vulgarly speaking, as a flag staff.

You have an opinion of your own fixed and decided in favour of the

Narrow Gauge; do I correctly gather your opinion that the result of these experiments will be the triumph decidedly, either of the Broad Gauge or of the Narrow Gauge, but the ultimate rejection of the mixed?

Yes, the ultimate rejection of the mixed, I think, beyond all question; I do not know a single practical man in this country who has not felt that as strongly as myself.

Though you think the Narrow better, yet you are of opinion, that whatever may be the decision with respect to the Narrow or Broad, that the effect of experiment will be the absolute rejection of all the mixed?

Certainly.

Will the policemen at all the switches, make arrangements so as to know which train is coming, whether Narrow or Broad?

The trains, I apprehend, must have different signals; but, in answering a question of that kind, I answer it off-hand to the best of my knowledge.

I believe that must, of course, take place; the policeman sees the trains coming up, and he will not know which it is, until it comes near; and the same specific and obvious signal must be made use of.

What will they do in case of fogs?

There will be a light; but that light will be indistinct. The moment you begin to multiply the mechanical apparatus of a Railway, you begin to render it a less perfect machine.

Complication increases danger and expense which can hardly be calculated?

Yes; therefore it has been my study, and the study of every engineer is, in the Stations of Railways to avoid those points and crossings to the utmost possible extent; and any one, in considering the arrangements of a simple Gauge, will tell you that one of the first things in doing that is, to avoid the multiplication of points and crossings. If on a single Gauge, where the danger is comparatively small, the proportion of accidents is proved to have been nine to one, how much more will it be when the crossings are quadrupled.

Apart from these dangers arising, the Broad and the Narrow Gauge stand on terms of perfect equality?

Yes; they do.

The preference of the one or the other will have to be decided distinct from this point of the mixed Gauge?

Yes.

Except between Cheltenham and Gloucester, are you not aware of the mixed Gauge anywhere else?

Yes, on the West London Railway; I had the mixed Gauge down myself; we were bound to do it by Act of Parliament. It went from the Birmingham Railway down to the Thames; and, on its way, it intersected the Great Western Railway, and, with a view of giving them an opportunity of access to the Thames, we were bound to lay down a third Rail; *but it has never been used.*

That afforded no trial of the mixed Gauge?

None whatever.

You do not consider the trial between Cheltenham and Gloucester will be a fair trial—it will be a straight line, without many indentations?

I do not think it will be a fair trial. I do not know what the powers of the Company are. I have told Mr. Brunel that I have no objection to his doing anything he likes in carrying out the mixture of the Gauge between Cheltenham and Gloucester; but I will never sanction the introducing of a mixed Gauge into the Stations. He has his own way on the Cheltenham and Gloucester Line; but I prohibited him going into the Stations.

Mr. Stephenson was cross-examined at great length by Mr. Serjeant Kingslake, with the view, apparently, of showing, amongst other points, that Mr. Stephenson had himself sanctioned the Double Gauge, in the case of the Bill promoted by the Midland Company for mixing the Gauges on the Broad Gauge line between Stonehouse and Gloucester, an attempt which Mr. Stephenson completely refuted. He was asked—

Do you know that some of the turn-tables they are using at Paddington are those which were originally intended for Euston-square?

I am not aware if it be so: admitting it, then I say they must have some for Wide Gauge engines and carriages, and some for trucks, perhaps, with their wheels so near to each other as to admit of a turn-table for the Narrow Gauge being used; but I stated that, taking the carriages of the Broad Gauge generally, they cannot be turned over the Narrow Gauge plate—nothing like it.

The futility of a mixture of Gauges as a remedy for the break of Gauge, unless the complex system becomes universal, is shown in the following question and answer:

(Mr. Serjeant KINGSLAKE.)—If you only work the Narrow Gauge down to Bristol, you intercept the traffic which will be going westward?

Yes; as between Birmingham and South Wales, and Cheltenham and Exeter, the break of Gauge would take place at Bristol. But it is a simple question—whether the break of Gauge ought to take place in that space of country where the traffic is very large, or whether it is to take place where the traffic is very small.

The fact being, that, in reality, a Mixed Gauge divides traffic, but makes two breaks of Gauge instead of one.

Mr. Stephenson was asked, in reference to the diagram he had exhibited of the Slough station, whether that was not an unfair illustration, because at Slough the up and down trains were both accommodated at the same side of the rails, and consequently a greater complication of rails produced than would be found in ordinary stations.

He replied that, as the complicated arrangements at Slough were adopted for the convenience of the public, either the public must be endangered by adding the complexity of the mixed system to the existing complication, or they must be worse accommodated by dividing the up and down stations. The single station, which now conveniently serves the public, would require to be copied on the opposite side of the road. He instanced Leicester and Derby, as on the same complicated principle.

In the course of this re-examination Mr. Stephenson stated, with respect to the line about six miles in length between Gloucester and Cheltenham, which the Great Western Company are now engaged in extending to a Mixed Broad Gauge, under powers obtained many years ago, that there are no intermediate stations, and it therefore affords the simplest and easiest case for applying the Mixed Gauge, and that—

> On the West London there is both the Broad and the Narrow Gauge for about a mile and a half. An application is now being made to Parliament for power to alter that line, and extend it across the Thames. Mr. Brunel and I met together, and the question of the mixture of Gauges was raised. I objected to the mixture, and Mr. Brunel conceded that we should apply for power to purchase land for laying down the two Gauges distinct from each other: therefore we are proceeding to Parliament for power to purchase land for four lines of rails; so that, in fact, instead of the case of an admixture, that will be for two distinct railways side by side.
>
> * * * * * *
>
> It is sufficiently evident to any one, that in a country like this (Stourbridge), access to the line can only be obtained by the construction of high embankments and deep cuttings; that, in proportion as the branches increase, of course the additional expense thrown on the proprietors becomes considerable.
>
> On a line which is to be used for a through traffic, going at a tolerable speed, those junctions and branches are always, to a certain extent, objectionable?
>
> They are always avoided, if practicable; but you cannot avoid them altogether.
>
> What is the objection? Does it arise from the insertion of the points or switches breaking on the main line of rail?
>
> A little breaking in the main rail at the crossing, but it is in addition to the introduction of a switch which requires mental caution—which requires to be watched by a man.
>
> A little deviation in the exact gauge is of no consequence; but at a crossing, it may be of the utmost importance that it should be exact.

He observed,—

> *I think, before Parliament sanctioned the Mixed Gauge on any large scale, some practical experience should be obtained on working lines. I do not think it will be well settled on a short piece of line; as you extend it, the complication becomes more and more intricate. The trial on the Oxford, Worcester, and Wolverhampton, will be a fair criterion.*

Mr. William Henry Barlow, the resident engineer of the Midland lines, followed Mr. Stephenson, and produced a register, referred to by Mr. Stephenson, showing the accidents which had arisen from engines or waggons getting off the line during the space of one year, from April 1846 to April 1847, on 300 miles of railways. The result of that register was to show, that of those accidents in which the engines and carriages have gone off the line (by far the most numerous and serious class of accidents), more than *eight accidents occurred at* points and crossings, where one accident resulted from other causes, independent of points and crossings. This record was prepared from the returns made fortnightly by the switchman of every accident on the line, and its cause. After citing various minor cases occurring at points, he says,—"the most serious accidents that ever occurred on any railway was the consequence of an engine having gone off at a point between Nottingham and Beeston."

Mr. Locke was called to corroborate Mr. Stephenson and Mr. Barlow. He stated, in most distinct terms, that having turned his attention to the question of mixing the Gauge of railways, he was not disposed to recommend or sanction it anywhere; that he thought it would be liable to cause great interruption of traffic; would be attended with vast expense —far greater than was at all contemplated; that it would be absolutely necessary to have separate stations; that danger would be produced by the multiplication of points and crossings, and by the consequent diminution of the solidity of the road. He says,—

> Points and crossings are not good things at very high speeds; and so long as the speed on a Railway is very small, the inconvenience of a point and crossing is not considered very great; but when you have a station with a number of points and crossings, and express trains passing through at 50 or 60 miles an hour, then it becomes rather serious.

The accident which occurred lately on the Grand Junction, which Mr. Stephenson spoke of, was on a portion of the Line which is under your care?

I did not know that Mr. Stephenson alluded to it, but there was an accident of that kind the other day.

What did it arise from?

It happened at a point. It was difficult to ascertain whether the point had thrown the engine off the line; but, at all events, it was at a point, there is no doubt about it.

In your opinion, generally speaking, are these accidents referable a great deal to the existence of these breaks on the line?

Yes, and they are likely to be more so if they are increased, and if the number of trains passing quickly over them are also increased.

Mr. Stephenson also told us that, besides accidents at the moment, it had a tendency to jar the axles, and produce eventually a fracture?

Always: I do not think I ever went over a point or crossing in my life at a high speed, that I did not feel it; and, if I felt it while sitting in the carriage, I am sure that the carriage under the spring must have felt it more seriously.

And in that way the carriage may go with a fractured axle, and at length give way?

It is the perpetual concussion on the flange of the wheel that produces the fracture of the axle.

Now points and crossings are distinct things from switches?

Yes, crossings are. There are permanent points and moveable points. The moving points are those which are managed by a switch, and a switch man.

Are those more inconvenient than the permanent points?

They are more dangerous, because they are liable to accidents by their being left; the fixed point is one which with proper fixed rails, there is not much danger in, excepting by the striking of the flange of the wheel against the check rail, or against the angular part of the crossing at the time the wheel is passing over it, and those are matters which produce the shocks to which I have alluded.

In the case of the switch, the carriage may be overturned, or thrown off owing to the negligence of the switch man?

No doubt of it.

Now to work a double system, a double stock is necessary?

Yes.

And is the stock of a Railway, a large item in the expenditure?

Very large.

And according to the course of traffic, one or other portion of that stock would have to lie idle?

Or to be worked with half work, to be kept in motion with half-work, that is if the traffic of a Line of Railway would justify half a dozen or a dozen trains, one half Broad Gauge, and the other half Narrow Gauge, of course neither stock would be fully occupied.

If you had a sufficient stock for working, either you must always have it ready if you work up to the daily power, then you would be likely to want power at the moment when you could not supply it?

No doubt, although you would require double, but there is no doubt there would be more stock by the two Gauges, than if you had only one, there is no doubt of it.

If I understand, there are those points in particular on the question of mixing the Gauges, the switches and crossings, and so on as affecting the solidity of the Rails, the separation of stations as a matter of expense and inconvenience, and also the double carriage stock?

Yes.

Are there any other points?

There are a great many other points in the working of a mixed Gauge, which would come on the public; if you had distinct trains, they could only stop at distinct stations. If you had a mixture of Gauge, having four Rails, and a Broad Gauge engine to draw a mixed train, then there would follow the inconvenience of having a

Narrow Gauge carriage stopping at a Wide Gauge station, and *vice versa*. It might happen, where waggons or carriages require to be shifted, that the trains would require to be taken back or changed from the Wide Gauge station to the Narrow Gauge station. If this be not so, the business of a mixed Gauge cannot be carried on by a mixed train. This will shew the inconvenience of working a mixed traffic with one train. If you have a mixed traffic with one train, you will have those annoyances.

And if you have not a mixed traffic with one train, you would have to add to your stock?

Yes.

And then as to his own waggons, he would require to have Broad and Narrow Gauge waggons?

Yes.

In order properly to use them both?

Yes.

That being your opinion, would the mineral owner of any district use both indifferently, or would they adhere to one?

I think they would adhere to one.

Supposing them both to be constructed, both the Broad and Narrow Gauge, to which, do you think, they would adhere?

To the Narrow.

You think that for mineral purposes it has a superiority?

Yes.

Do the difficulties of a mixture of the Gauge apply in any enhanced degree where the Line is for mineral accommodation, and to be joined frequently by tramways?

If it is to be frequently joined, it becomes more difficult and dangerous; because it is at those very crossings where the chances of collision are more likely to arise.

And I presume that the owners of mines adjacent could hardly make use of both Gauges?

That is just as it happens, whether a proprietor has a colliery on one side of the Railway or the other. If he is on the Broad Gauge side, he will have to cross the narrow rails; and if on the other, he will have to cross the broad; and if it is a mixed Gauge, he cannot get off the one across the other without subjecting himself to the interference, by both trains coming in opposite directions, both on the Broad and the Narrow Gauge.

If he is to get any benefit from using both Railways, he will require to construct his tramways on both Gauges?

Certainly.

So that either a mixture of Gauge is of no use to him, or is to be purchased by himself going to the expense of having a mixture on his own land?

Exactly.

Is that on account of the size of the waggons?

Yes, and the facility of transport. It is much more handy for men about the colliery: it is more handy to use the Narrow than the Wide.

The Broad Gauge waggons, filled with minerals, would require a horse?

Yes. To show you that, in the North of England, they have never come up to the size of waggons that are adopted chiefly on the Narrow Gauge Lines.

That is, when they were working on their own tramways, they took a lower Gauge than the 4 feet 8½?

No: when they had the same Gauge, they never had a waggon which contained 5 tons of coal, but always 2 tons 13 or 14 cwt.

* * * * *

You may complicate the Gauges, where you have a moderate speed, and no danger would arise to the public; but if you bring them to a high speed, on that complicated system of Railways, you would have accidents.

The cross-examination of Mr. Locke was all directed toward proving that he had sanctioned a circular from the Grand Junction Company, threatening to lay down a Mixed Broad Gauge line, when they were at war with the London and Birmingham Company. The said circular, however, turned out to be a mere electioneering squib, unsanctioned by the engineer of the Company issuing it.

The Cost of the Mixed Gauge.

It will be observed that Mr. Stephenson, Mr. Locke, and Mr. Wyndham Harding are agreed, and give solid reasons for their belief, that to enable the Mixed Gauge to be worked, will require separate stations for the Broad and Narrow Gauge trains (see pp. 30, 32, 36), separate and additional engine sheds, and other buildings. Mr. Stephenson gives some idea of the expenses which may be anticipated, but cannot be calculated until the Mixed Gauge is put in practice, when he states that at certain stations, the number of "*points*" will be increased from 37 to 77, and that each point costs 50*l.* making the expenses of points alone 3,850*l.* instead of 1,850*l.*

It has been proved that if the Narrow Gauge is not to be a mere sham, a supply of Narrow Gauge engines and carriages must be kept up in addition to Broad Gauge stock of the same description; so that, in fact, under an *honest* carrying out of the Mixed Gauge system, almost everything must be provided in duplicate, while the traffic remains single. For instance, in what may be called the Wolverhampton mineral district, there are three hundred works, each of which possesses, or will possess, a tramway running down to the main line. Unless these works are provided with a communication on a Mixed Gauge, and with both broad and narrow trucks, they will be only half accommodated. Therefore, to all the expenses of the public main lines, must be added those of adapting and working the private Narrow Gauge branch lines, which are in universal use and favour in mineral counties.

Now, Mr. Brunel's estimate for a Mixed Gauge, like all his railway estimates, only includes the bare cost of laying down the rails, leaving all the expenses essential for working the inner rail to Providence, or the Narrow Gauge interest. The following is said to be Mr. Stephenson's estimate for laying down the Mixed Gauge, under the cheapest and most favourable circumstances; that is to say, when the Narrow Gauge is introduced on a Broad Gauge line.

ESTIMATE OF THE ADDITIONAL CAPITAL REQUIRED TO CONSTRUCT AND WORK A RAILWAY ON THE NARROW AND BROAD GAUGES, WITH THREE RAILS FOR EACH LINE OF RAILS.

COST PER MILE.

1	Works	£750
2	Permanent Way	2750
3	Sidings not connected with Stations	150
4	Points and Crossings	200
5	Passengers' Stations	175
6	Goods' Stations	700
7	Plant	2275
	Additional cost per mile, double way	£7000

In the great majority of cases in which it is proposed to lay down the Mixed Gauge, the device of this complicated system is made a pretext for making that a Mixed Broad and Narrow Line which would otherwise be simply a Narrow Gauge Line.

Mr. Brunel has very ingeniously argued that a Broad Gauge bridge, viaduct, embankment, and tunnel need not necessarily be wider than the same description of works on a Narrow Gauge line. There is no knowing what risk Mr. Brunel may choose to run in support of his theory; but it is self-evident that if the works of Railways of the 7 feet

Gauge are to be in due proportion, they must be one-third wider than those of the 4 feet 8½ in. Gauge; and, what is more, we know that they are. For instance, take the comparative width of the South Devon single track Broad Gauge, and the Southampton and Dorchester single track Narrow Gauge. There are instances on great main Narrow Gauge lines on which, with the view of ultimately constructing long side lines, or re-duplicating the rails, a breadth has been given to the earthwork, &c., equal to that of the Great Western; but one swallow does not make a summer, and, in comparing the expenses of two systems, we must compare the cheapest mode of executing both. If a Broad Gauge is to be added on a Narrow Gauge Line, traversing a difficult country like that intersected by the Manchester and Leeds Railway, or to an extension carried on arches through valuable house-property, like that of the South Western Railway to London Bridge, and some of the Manchester Junctions, or if a number of tunnels are to be pierced, and high embankments raised, as will be required in South Wales and other mineral counties, the expense of the addition will amount to from 15,000*l*. to 20,000*l*. a mile, without counting the cost of extra stock or stations. Considering, therefore, that it is in mineral and populous districts that the Great Western are most anxious to push the Broad Mixed Gauge, it is by no means extravagant to average the additional capital required for all the mixed lines projected by the Great Western Railway at 10,000*l*. a mile.

But this is not all. A Mixed Gauge Railway is much more expensive to keep in repair than a simple Gauge. It was proved by Mr. Wyndham Harding, that "on the Bristol and Gloucester Railway, for the part of the road a Narrow

Gauge line was laid within the Broad Gauge; and, although it was never used, the contractor for the maintenance of the permanent way, demanded an addition, in consequence, of 50 per cent. which Mr. Brunel allowed;"* and Mr. Jackson, a railroad contractor, told the Gauge Commissioners that

> If I were called upon to enter into a contract to maintain a road properly for the purpose of conveying the public over it by trains, I would much rather maintain one road down and the other up, than I would have two roads down and two roads up—the expense of the thing would be very considerably increased. Where it can be done with one pair of rails, either 7 feet or 4 feet 8½ inches, it is much preferable in point of security and economy, and certainly of performance.
>
> 6500. Supposing the [maintenance of the] lines to cost 300*l.* a mile per annum for finding the rails and chairs and maintenance of permanent way, under the contract I had with the London and Birmingham Company, if a double line was laid down, I should be inclined to think that 100*l.* per mile in addition would do it.

And he winds up by saying,

> I see no inducement or price which would induce me to enter into a contract to maintain both roads, if I were to be responsible for accidents arising out of the same to passenger trains and goods trains.

It is therefore abundantly evident, that the extra annual expenses of the interest of money, at five per cent., on the additional capital required for making and working a Mixed Gauge, added to the expenses referred to by Mr. Jackson, would amount to little less than 600*l.* per annum per mile. Three hundred miles of Double Gauge are making, or proposed to be made, by the Great Western Company—that is to say:

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* See p. 25.

DOUBLE GAUGE LINES SANCTIONED UP TO 1847.

The Double Gauge is already determined to be adopted between Abbottswood and Wolverhampton, a distance of 38 miles	38	Miles.
Oxford and Rugby	50½	,,
West London Railway	3	,,
Oxford, Reading, and Basingstoke *	40	,,
Gloucester and Cheltenham	7	,,
	138½	Miles.

DOUBLE GAUGE LINES PROPOSED.

Stourbridge to Spon Lane, &c. (*rejected*)	15	Miles.
Evesham to Cheltenham	14½	,,
Evesham to Stratford	13	,,
Stratford to Warwick	9	,,
Oxford to Birmingham (including Branch from Kingswood to Stratford)	42	,,
Birmingham, Dudley, and Wolverhampton	14½	,,
Banbury, Coventry, and Nuneaton	14	,,
Yeovil to Exeter	45	,,
	167	Miles.
Total	305½	Miles.

	Annual Cost.
300 miles at 10,000*l.* a mile = 3,000,000*l.* at 5*l.* per cent.	£150,000
300 miles at 100*l.* a year each, for cost of maintenance	30,000
	£180,000

or take the smaller sum of Mr. Stephenson's very moderate calculation, and we have—

300 miles at 7000*l.* a mile = 2,100,000*l.* at 5*l.* per cent.	£105,000
300 miles at 100*l.* a year each, for cost of maintenance	30,000
	£135,000

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* In order in 1846 to defeat the line from Cheltenham to Southampton known as "The Manchester and Southampton Railway," the Chairman of

Taken at either calculation, there is a sum of between two and three millions to be permanently sunk—as much wasted as if spent in spoiling Irish roads, for the mere purpose of mitigating the Break of Gauge which Mr. Brunel first said would never happen, and next asserted might be cured, with no loss of time, for a farthing a ton; beside thirty thousand a year upon keeping the permanent ways in good order, which, in spite of all care, will be ten times more dangerous than a simple railway on any Gauge. Every inquiry has proved the Broad Gauge system to be not only much more expensive, but infinitely less convenient for the conveyance of either travellers or merchandize, with the exception of the few who avail themselves of the express between London and Exeter.

If we did not understand the manner in which parliamentary votes on private Bills are obtained, and in which weak governments are squeezed, we should be amazed at this reckless waste of the resources of the nation on a crotchet which changes a system—simple, cheap, and safe, and which is every day becoming cheaper and safer, into a chaos of complication, danger, and expense.

For years the Legislature has professed to be engaged in considering the means of extending to the poorest classes, and the poorest districts, those benefits which railroads have conferred on productive counties, and wealthy travellers. With this view, measures almost arbitrary have been adopted; and an active, not influential party in the Lower House, are now anxious, by a sort of Procustean process, to carve down fares to the Continental level, without

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the Great Western Railway appeared before the Committee of the House of Lords with a resolution of his co-directors, pledging themselves if the Bill were thrown out to lay down a Mixed Gauge from Oxford to Basingstoke.

any regard to the rights of property conceded and confirmed by a series of dearly bought Acts of Parliament.

The tax originally imposed on railway passengers was one-eighth of a penny per head per mile, which was supposed to be rather less than the average of the tax paid by stage-coach passengers. In consequence of the evidence given before the Committee of the House of Commons of 1839, by the representatives of Companies which had encouraged cheap third-class trains, showing that a poll-tax acted as a direct discouragement of cheap trains, an eighth of a penny being 12½ per cent. on a penny a mile, and less than 4 per cent. on fourpence a mile, it was commuted into a tax of 5 per cent. on the gross passenger revenue.

In 1844, a Select Committee of the House of Commons was engaged, for three weeks, in a close investigation of our railway system, in the course of which the advantages of low fares for the working classes were again prominently brought before them, in the evidence of Mr. Samuel Laing, then secretary to the Railway Department of the Board of Trade.

Mr. Laing, in common with all persons who have paid any attention to the subject, confessed that, desirable as it undoubtedly was to reduce English fares to the level of the Belgian and German tariffs, the high cost of railway construction in this country rendered such an arrangement impossible. He put in evidence his statistics of British and Foreign Railways, prepared from official documents collected by the Board of Trade, showing that the average cost of English Railways was 34,360*l*. a mile; while the Railroads were executed in Germany for 10,000*l*. a mile, and in France for 20,000*l*. And Mr. Laing estimated the unnecessary expenses of English Railroads at 7,700*l*. per mile, of which sum he assigns 5000*l.* to *extravagant expenditure in the execution of works.*

The evidence adduced before this Committee,* illustrative of the advantages of low fares, led to the adoption of a series of resolutions, upon which an Act of Parliament (Vict. 7 & 8 cap. 85. s. 6) was framed. This Act compels all Railway Companies applying to Parliament, whether for new lines, extensions, or amalgamations, "to provide" one train each way on every week-day, with carriages, provided with seats and covered, protected from the weather, at fares not exceeding a penny per mile." It abolished the tax on travellers conveyed by such trains, and it established a periodical revision of the fares of those Companies, paying a dividend of 10 per cent.

Thus financial changes have been effected, the last being a *bonâ fide* sacrifice of revenue, in order to secure to the labouring classes the benefit of cheap conveyance. No common object could have induced a Chancellor of the Exchequer to resign a source of income so productive, and so easily collected.

These measures were entirely successful; the proportion of third-class passengers rose to 54 per cent. in 1845. And except upon Broad Gauge lines, where the comforts and convenience of all other persons and property are sacrificed to expensive luxurious express trains, on all the Lines in the kingdom where clusters of towns lie along the track of the railroad third-class carriages, at low fares, are five and six fold more numerous than the Act of Parliament requires.

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* To convey the labourer cheaply and rapidly to that spot where his labour might be most highly remunerated, was frequently stated to be one great benefits which would be derived from opening these new channels of ntercourse. Your Committee believe that Parliament would deeply

"If we turn from those Railways which merely afford third-class passengers the accommodation *enforced* by Parliament to those which, by numerous cheap trains at ordinary speed, seek to develope local traffic,—or to the Irish lines, which are exempt from all taxation, and where the third-class fare is about ½*d.* per mile,—we find the third-class far outnumbering the first-class. For instance, on the—

Miles.		1st-class.	2nd-class.	3rd-class.
31¾	Dublin and Drogheda	29,386	216,903	320,221
95	Eastern Counties (Colchester line)	92,635	266,190	110,736
46	Edinburgh and Glasgow	89,987	178,626	581,406
85	Manchester and Birmingham ..	94,824	262,218	647,315
61	Manchester and Leeds	115,192	335,337	1,224,417
	Midland	225,347	595,294	988,503

"On the Irish line, third-class trains accompany nearly every train; on the Eastern Counties, there are thirteen third-class out of twenty-two daily trains; on the Edinburgh and Glasgow, fourteen trains, with either third or fourth-class carriages attached, out of sixteen daily trains; on the Manchester and Birmingham, twelve out of twenty-four; on the Manchester and Leeds, seventeen out of thirty-five; on the Midland,—six out of twenty-four between London and Leeds,—ten out of eighteen between Derby, Nottingham and Lincoln,—and six out of fourteen between Birmingham and Derby." *

Since 1844 several railroads have been constructed more cheaply than Continental lines, engineers have gained experience, landowners have become less rapacious, juries less

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regret to find that the tax imposed on Railway passengers had a tendency to deprive the labouring classes of these promised advantages.—Fourth Report, 1839.

* *Speed on Railways considered in a Commercial Point of View.*

liberal and more discriminative. Cheap fares have followed. The Norwich and Brandon cost, for a double line, 13,000*l.* a mile; and there, in an agricultural district, cheap construction enabled the experiment of frequent trains at low fares to be tried with perfect success, as may be seen in the evidence of Mr. Peto before the Committee of the House of Commons, 1846; the Southampton and Dorchester, a Narrow Gauge line on a single track, cost 9,000*l.* a mile; and as a double line, would only cost 12,000*l.* a mile.*

On all railways, however populous the district they traverse—however profitable they may eventually become, the addition of 7000*l.* to 10,000*l.* a mile to the original capital, for the establishment of the complicated Gauge, must indefinitely postpone the period of revision of fares provided by the Legislature, without in the slightest degree advantaging the shareholders; but if the Mixed Gauge is to be added to railways traversing districts like Norfolk and Dorset, and if a mile of railway which might have been made for 12,000*l.* is to be raised to 22,000*l.*, shareholders may bid farewell to hope of dividends; and our peasantry must resign all hopes of accommodation, *except that enforced* by Act of Parliament.

An application of the simplest rules of arithmetic will best prove the injury which the wasteful expenditure entailed by the Mixed Gauge, will inflict on all passengers, and on all parties to whom it is important to forward goods or merchandise at a cheap rate,—a tax infinitely more onerous than all that has been repealed. Ten thousand pounds a mile for the Mixed Gauge, with 100*l.*

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* Select Committee on Railway Acts Enactments, 1846, p. 249.

a year for maintenance, will give just 600*l.* a year a mile, as the annual cost of the new system; that is to say, as nearly as possible 12*l.* a week. Twelve pounds a week would convey 2,880 passengers, who now pay a penny a mile, gratis! *Extend this calculation to the whole length proposed to be embraced by the Mixed Guage, and we find that nearly a million passengers or a million tons of coals might be carried three hundred miles every week for nothing, with less pecuniary injury to the interests of shareholders than the Mixed Gauge will inflict.*

Mr. Stephenson illustrated this objection very completely, even on Mr. Brunel's calculations, when he said before the Gauge Commissioners:—

> 224. I would observe in passing, that, *if the mixed Gauge system be allowed to extend in this country, the charge upon coal will, in many cases, amount to a prohibition.* I mean that it will charge the coal with a much larger toll if we suppose capital to have an influence on the tolls, which it must either directly or indirectly. *It is all very well to say that the Company has a maximum toll,* and cannot exceed it—a penny a ton—*but they may lower it.* Very few Companies charge their maximum rates, showing that Companies rather tend to lower, to consider what they can carry at a decent profit. But in the case of the mixed Gauge, I pointed out very prominently the consequences of laying down a Double Gauge from Oxford to Rugby. *At* 4000*l. a mile, it would be* 200,000*l.*; the interest of that is 10,000*l. a year. That would carry* 60,000 *tons of coal over the whole distance for nothing,* instead of a penny a ton a mile; therefore, whichever way you look, it comes to a commercial question at last. You must have interest for your money; and if the Railway Company were not compelled to lay down that additional Gauge, *they would still be able to pay the proprietors a certain per-centage, and carry* 60,000 *tons of coal for nothing.* Hence it is, that when you are carrying either minerals *or such descriptions of merchandize as corn,* that will not allow of high charges being made, you must consider the expenses of the Line.

There cannot be a question that it would pay a Company like the South-Western infinitely better, as well as serve the public infinitely more, to run one fourth-class train daily from Salisbury to Yeovil and Exeter, at a farthing a head a mile with twopence for their maximum fare for first-class passengers, than to lay down the Double Gauge over that distance. The fact is, that an expence of from 3000*l.* to 6000*l.* a mile will, in those thinly-populated districts, where corn is grown and coal is wanted, frequently make the difference between a dividend and no dividend. For all such extravagances the public must pay in meal or malt. Express passengers won't pay—money is no object to them: first-class passengers won't pay—the limits of the tariff protect them: poor people will pay—in fewness of trains, in inconvenient hours, and many delays on the road. The tax both on what is done and what is left undone, will fall on "coals, corn, and countrymen."

Again, Lines which penetrate districts so rich that they can bear a great amount of extravagance, where even the Broad Gauge, which has kept down the Great Western dividends below the South-Western, would reap 10 per cent. will sink 2 or 3 per cent. under Mixed Gauge expenses, and the effect of the revision of tariff clause will be indefinitely postponed.

The fable of the dog and the shadow was never more completely illustrated than in the manner in which the Houses of Lords and Commons have sacrificed cheapness and general convenience, and all they professed to be desirous of obtaining for the many to the fallacious advantages of the Broad Gauge express.

The Danger of the Mixed Gauge.

Supposing all financial objections to be abandoned, it is quite certain that, in order to work the system efficiently, the Narrow Gauge line must be in the hands of a Narrow Gauge interest, and the Broad Gauge in that of the Great Western Company, because we know that the one will not willingly keep up or work two descriptions of stock. Mr. Saunders, the secretary of the Great Western Company, owned this in 1845 when he said, speaking of the Oxford and Rugby line, which he then hoped to gain on the simple Broad Gauge,—

> 3850. What inconvenience would your Company experience from Rugby to Oxford, if a Narrow Gauge line alone were made?
>
> I apprehend we *should be obliged to work two separate and distinct species of stock.* We should be obliged to have a Narrow Gauge stock, as well as a Broad Gauge stock, and it would be attended with expense to us who have our Broad Gauge stock to work; then of course whatever inconvenience there may be attending the change of Gauge, would be sustained by our Company.
>
> 3859. I question, if the object be to have a Narrow Gauge, whether it might not be as well worked by somebody else instead of by the Great Western Company, and let it take its chance of having very little traffic to carry over it.

And Mr. Brunel, in 1847, (p. 20), acknowledged that, in calculating the cost of the Mixed Gauge, he had made no allowance for the cost of Narrow Gauge; indeed, he carefully avoided pledging himself to make any use of it—he merely presumed "they would do all they could to develope traffic." Locomotives cannot be built in a day, yet three Mixed Gauge lines are in active progress, and we do not hear a word of any Narrow Gauge stock building at Swindon. It never will be built, and it never will be used by the Broad Gauge Company, or by any one else, if the Great Western Directors can prevent it—and they can.

On this point, there is a fund of valuable evidence available.

The early Railway Acts were granted, under the impression that railways, like canals, might be employed by any person choosing to introduce conveyances upon them, on paying a tollage for the use of the road.

This plan did not answer, and the Committee of the House of Commons of 1839, composed of Mr. Poulet Thompson, Sir Robert Peel, Mr. Shaw Lefevre, Lord Granville Somerset, Mr. Thornley, Lord Sandon, Mr. Loch, Mr. Freshfield, Sir John Guest, Lord Stanley, Sir Harry Verney, Mr. Bingham Baring, Sir John Graham, and Lord Seymour, reported that,—

> Any person with mere authority to place an engine and carriage on a Railway, *would be practically unable to supply his engine with water, or to take up or set down his passengers at any convenient station or terminus, and, indeed, would be placed in such a disadvantageous situation, that* all competition with the company would be rendered impossible: *the safety of the public also requires that upon every Railway there should be one system of management, under one superintending authority*, which should have the power of making and enforcing all regulations necessary for the protection of passengers, and for duly conducting and maintaining this new mode of communication.
>
> Your Committee deem it indispensable, both for the safety and convenience of passengers and the public, to prohibit, so far as locomotive power is concerned, the rivalry of competing lines on the same line.
>
> After making every inquiry, your Committee feel bound to state it as their opinion, that where the same line of rails is to receive trains arising *from two or more separate lines of communication, the risk* of accidents is greatly increased.

Any company can virtually prevent other companies from passing over their line of road, by depriving them of all necessary accommodation.

In 1840, a Select Committee of the House of Commons, in their 3rd Report (p. 4), states that,—

In the first instance, undoubtedly, many Railway proprietors believed that they were to derive their profits and the return from the tolls only, and that it was not for their interest to be engaged in the carriage of passengers or goods. * * * *It was eventually acknowledged that these lines of communication must be placed under one individual control and authority, and that any departure from this principle would be attended with the greatest injury to their property, and inconvenience to the public, if not with more calamitous results.*

And the Report goes on to recommend,—

That so far from enforcing those intentions (viz., to permit various persons to employ locomotive power on a line), by any additional legislation, parliament should abandon a course *which could only render these great lines of communication inefficient and unsafe.*

These extracts, although not applying to the Double Gauge system, refer to a theory very similar to that of the Double Gauge, which practical experience soon proved to be dangerous and inefficient. There can be no doubt that in the hands of one company one of the two Gauges will be a mere *sham*—if worked by two companies, the system will be neither "efficient nor safe."

It is of very little consequence, whether two engines running over the same road are both of the same dimensions or not, as long as they are under the control of two different parties, and subject to all the irregularities of divided authority.

Mr. Brunel himself said before the Oxford, Worcester, and Wolverhampton committee,—

9759. Where two lines of railway are to be worked—the Narrow and the Broad Gauge—upon the same line of railway, it is desirable the whole should be in the hands of one Company.

If, however, our powers of imagination are so vivified by dwelling on the splendid speculations of Messrs. Brunel and Saunders, that we can conceive a Mixed Gauge—constructed without regard to expense, and worked in harmonious perfection by the Broad and Narrow Gauge interests, physical dangers remain, against which the most lavish expenditure, and the most ingenious arrangement, can but imperfectly guard.

Points, Crossings, and Switches.

It is self-evident that the safest possible railroad amongst perfections, would be formed of perfectly continuous unbroken rails, from end to end. Such a mode of construction is impracticable. Wherever a railway is intersected by another railway, or wherever arrangements must be made for turning off the main line, there the rails are cut and intersected. In stations where there is much traffic, and where many lines meet, the ground becomes intersected with a real iron net-work; but, instead of knots, there are pieces cut out where the lines cross. Some of these crossings are fixed; some are regulated by machinery, either self-acting, or under the charge of "switchmen."

Mr. Stephenson and Mr. Barlow (p. 29, *et post*) proved that out of the accidents on 300 miles of the Midland Railway, those arising at places where the rail was divided, were in the proportion of eight to one; and these cuttings or divisions would be doubled, and even quadrupled, by Mixed

Gauge arrangement. Mr. Stephenson observes, "unless a line be broken, you are perfectly safe in passing over it; but in case of points and switches, you must depend on the vigilance of the men employed;"* and he makes use of a phrase which contrasts strongly with the flashy projects of his rival, while it is characteristic of the practical tone of the speaker's mind—"*One of the essential features of a Railway is extreme simplicity.*"

Mr. Locke says:—"I do not think I ever went over a point or crossing in my life that I did not feel it, and if I feel in the carriage, I am sure that the carriage under the spring must have felt it more seriously; and in that way the carriage may go with a fractured axle, and at length give way."

What, then, are we to gain in return for increased expenditure and increased risk of accident—increased efficiency? Certainly not! The Mixed Gauge does not destroy the break of Gauge, it only divides it. The traveller who started by the Narrow Gauge from Manchester must change at Wolverhampton or Oxford before he reaches Bristol. The goods sent by Bristol to Manchester must be shifted at Oxford. That there is at present very little communication between those two cities is true; and there never will be, if impediments of tariff, and impediments of mechanism are permitted to be raised up by the feeble compromising spirit of our rulers.

Who support the Mixed Gauge—Since when, and why?

We have compared measures—we have weighed evidence—and the balance is overwhelming in favour of a

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* See the frightful accident reported in the *Times*, 7th June, by which seven individuals lost their lives through the mistake of a switchman.

Uniform Narrow Gauge, or, at any rate, in favour of the ultimate abandonment of the Mixed Gauge, and triumph of either the Broad or Narrow system. But let us turn to the men, and see who are they on whose authority we are expected to repudiate either the practice or the testimony of every railway engineer in Europe, and of Mr. Brunel himself, out of England, and to adopt for the future the Broad Gauge and the Mixed Gauge in preference to the cheap simplicity of the uniform Narrow Gauge.

Foremost, and as an engineer alone, stands Mr. Brunel, a man of great talent undoubtedly, fertile in expedients, never daunted by difficulties, never appalled by defeat; the *beau ideal* of a partizan; energetic, enthusiastic, and probably as perfectly sincere in the Protean fallacies he palms upon his deluded followers; as firm a believer in his own infallibility as Mahomet—or the last Pope. But calm bystanders must not forget that Mr. Brunel has changed his opinions very many times, and that each change has tended, whatever may have been the conscientious cause, to the triumph of the system on which his name, fame, and fortune rests.

Such heavy charges must not rest without proof: we shall therefore proceed to quote Mr. Brunel's recorded evidence and opinions from the year when he triumphantly imposed his exceptional Gauge on the Great Western Company, down to the present session.

In 1838, very many objections, especially that a difference of gauge would interrupt the interchange of traffic between the Great Western and railways on the National Gauge, were raised to Mr. Brunel's scheme, and these objections were supported by the opinions of George and Robert Stephenson, and by special reports from

Messrs. Nicholas Wood and John Hawkshaw. To overcome this opposition, Mr. Brunel made several counter reports to his Directors, and especially one dated the 15th of August, 1838, (now out of print and very scarce,) which ought to be in the hands of every one inclined to put trust in Mr. Brunel's decisive and oracular testimony in support of all Great Western projects. This remarkable report gained a complete victory over all his opponents, and made Mr. Brunel's fortune, and it is worth noting, because every prediction and every promise contained in it save one has been falsified by experience.

He promised that a saving, fully equal to the cost of the additional land required by the Broad Gauge, should be effected by using light rails on longitudinal timbers.

The light rails failed. The heaviest that can be made are in use on the Broad, as on the Narrow Gauge.

He promised—that a great saving in maintenance of way should be effected by placing the longitudinal timbers on piles.

The piles were tried from Paddington to Maidenhead, and were abandoned.

He promised that safety should be obtained by placing passenger carriages within instead of upon the wheels.

Passenger carriages are never placed within the wheels on Broad Gauge Lines.

He promised economy in maintenance and machinery, in compensation for a *fractional* increase of expenses in construction.

He promises the same still, but for merchandize, cattle, coal, and passengers, the Broad Gauge Lines are the dearest in the kingdom, on an average of all, by 50 *per cent.*

And then he made some prophecies, but these must be given in his own words.

> "I shall now," he observes, "consider the question of the disadvantage of differing in point of Gauge from other Railways, *and the consequent exclusion from communication is the first.* This is undoubtedly an inconvenience: it amounts to a prohibition to almost any Railway running Northward from London, as they must all, more or less, *depend for their supply upon other Lines, or districts where Railways already exist*, and with which they must hope to be connected. In such cases, there is no alternative. The Great Western, however, broke ground in an entirely new district, in which Railways were unknown. At present it commands this district, and has already sent forth branches which embrace all that can belong to it. It could have no connexion with any other of the main lines, and the principal branches likely to be made almost formed part of the original plan, nor can *these* be dependent upon any other existing lines for traffic which they will bring to the main trunk."

COMMENTARY.—The Great Western Railway, within five years from its completion, is only isolated by its Gauge. At Gloucester, at Rugby, at Birmingham, at Wolverhampton, at Basingstoke, at Oxford, at Salisbury, at Dorchester, it is, or is about to be, or desires to be, connected with Narrow Gauge Lines; and so far from England being cut up into Railway districts, according to Mr. Brunel's original theory, there is not one town of 1,500 inhabitants, that either is not at present, or does not confidently expect to be, connected with every other town. In fact Railways are forming a net so close, that the merest hamlets will be enclosed in the meshes. Instead of the Great Western having no connection with the Northern Lines, it has the very closest possible connection, and contemplates, Parliament permitting, an extension into Lancashire.

> "At the London extremity there exists no possibility of a connection with any other Line. London will always be the terminus of those main Lines now established, and which approach it from distinct quarters; and the traffic of each will cease at that point, and they will have no communication with each other at this extremity."

COMMENTARY.—During the session of 1846, all the "main Lines" brought forward plans for a general metropolitan junction. The South Western Railway has in progress of execution an extension which will eventually unite it with the South Eastern, the Brighton, and Eastern Counties Lines. A Committee of the House of Commons has just passed the preamble of a Bill which permits the Great Western (already united by the Thames Junction with the London and North Western, although divided by the difference of Gauge) to cross the Thames and fall into the South Western Terminus at Nine Elms.

> "The Great Western was therefore free to adopt its own dimensions, and none of the difficulties which would entirely prevent such a course in the North of England had any existence in the West; and, consequently, all the general arguments and comparisons made on the supposition of such difficulties occurring—all excellent in case they did—are totally inapplicable to the particular case of the Great Western Railway, to which they have no reference whatever"!!!

This needs no comment.

> "The adoption of a different Gauge is compared [*in Mr. Hawkshaw's Report*] at p. 12 to the construction of a canal in a country of canals, with locks of such a character as would totally shut out the boats of all the canals that surrounded it. In the first place, the west of England is not a country of Railways; and in the next place, there is no similarity in the mode of conducting the carrying department of a Railway and a canal. A barge, with its master and his family living on board, may go, and does occasionally go, without inconvenience, far out of the usual beat. Railway carriages and waggons must

> belong to the particular Line on which they run; and, except in such cases as the Grand Junction and London and Birmingham Railways, which form, in fact, one Line, although they happen to be made by two Companies, it will never pay to trust them in the hands of others."

A glance at a Railway Map will convict Mr. Brunel of one mistake; a reference to the records of the Clearing-house of another.* The west is now a country of railways; railway-carriages travel farther from home than any barge ever did.

But Mr. Brunel was successful in making the Great Western shareholders believe that a peculiar system was suited for a peculiar district; and that every district might, without inconvenience, adopt the Gauge and the mode of construction which seemed most suitable to the traffic, whether in first-class passengers, woollen goods, coals, or fat cattle,—a theory which he has carried out by adopting the Narrow Gauge on the Taff Vale, a curved coal Line, and in Italy.

There was one more promise which he made, to which it would be unfair not to allude.

He guaranteed increased speed. This promise he has

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* In 1845, 75,783,149 passengers were booked through on Railways with which the Clearing-house was connected.

The average mileage of each passenger being	146 miles.
The average length of Railways connected with the Clearing-house	41
Average number of Junctions passed by each passenger	3·61

In the same period the number of loaded carriages, trucks for private carriages, horse boxes, post offices and goods waggons, passed through the clearing-house, was 180,006; all of which, according to Mr. Brunel's theory, in 1838 and 1845, must have been unloaded at least once, if not three times, in each journey.

performed. Between London and Exeter, by an express train each way daily—between London and Bristol by two more, an average speed of 40 miles an hour—is maintained. The speed of the other trains varies, and, indeed, declines so much that the average speed of all the daily trains falls below that of several Narrow Gauge Lines. How much is due to Gauge, and how much to gradients, remains to be proved. On the Edinburgh and Glasgow, which runs no express trains, with gradients equal to the Great Western, the slowest train exceeds 20 miles an hour; on the Great Western, the average speed to Bristol, including the expresses, is only 23·97; and on the Swindon and Gloucester, where curves are acute and gradients bad, the express cannot do more than 33 miles an hour.

To put the point in a view which all can understand:—the Narrow Gauge express train from London to Liverpool, running for 100 miles of the way up a steep hill, and all the way interrupted by heavy cross traffic, is an hour and a half longer in completing the distance than the Broad Gauge express, galloping over a level with a clear course.

The swift Broad Gauge courser having this drawback to his usefulness—he only gallops for rich people; common folks he draws as slowly as the Narrow Gauge; and when he condescends to convey coals, tar, pitch, timber, hardware, iron, dry goods, and live cattle, it is at an advance of from 15 to 100 per cent.

From the period of the grand victory gained by the document which has just been dissected, there are no written records of Mr. Brunel's opinions on railway matters until 1845. In that year it was his object, on behalf of his patrons, to bring about that intercommunication with the northern Narrow Gauge lines, which he had formerly proved to be impossible. He changed his mind, and no longer considered a change of Gauge a serious evil. He said, that with perfect facility waggons might be constructed, at an expense not worth considering,—

> Fitted for transferring coal loaded in boxes from platform of Narrow Gauge waggons to the platform of Broad Gauge waggons.

That the transfer might be effected—

> *Very expeditiously, and at an expense not worth consideration.*

That he had a contrivance at Paddington—

> By which waggons with a full load are lifted up and back again at a very trifling expense.[*]

That—

> Where machinery is wanted, there are plenty of ways of doing it,—

(viz. overleaping a break of Gauge). That,—

> Without any difficulty or expense,—

The Broad Gauge company could—

> Take Narrow Gauge waggons and all, just as they came down, upon their trucks, and take them down the line.

That he had offered the Board of Trade—

> To be at the whole expense of having machinery arranged for the purpose of transhipping coals and goods from the Great Western to the Southampton line.

That—

> 200 or 300 tons of coal might be shifted in one hour by one set of apparatus, and would not cost more than a halfpenny a ton altogether.[†]

That—

> The transfer of the loose bodies of carriages from Narrow Gauge

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[*] 9797. Oxford, Worcester, and Wolverhampton Committee, H. C. 9804.

[†] 10333—10361.

wheels to the Broad, or the transfer of whole carriages of goods to trucks, can be done very easily, and at a cost and time that is inappreciable—making a large allowance for men, and assistance in moving the waggons and everything.

In fact, the whole tenor of Mr. Brunel's evidence went to prove that the evils of a break of Gauge were a mere bugbear, conjured up by the Narrow Gauge interest.

In order to give additional force to his testimony, a little drama was performed at Paddington,—

A large assemblage of lords, members of parliament, and their ladies were invited there to see a very pretty machine by which a large box containing coke was moved from the rails of one Gauge to those of another, as if by magic, and it was left to be inferred, that a mail from Manchester, or a hundred tons of iron, could be transferred from the Narrow Gauge Grand Junction to the Broad Gauge Oxford, Worcester, and Wolverhampton line with equal facility.

It is only fair to add that Mr. Brunel's evidence was corroborated by Mr. J. Walker, a great authority in marine engineering, who once made a quarter of a mile of railway; and by Mr. W. Cubitt, who always indorses Mr. Brunel's bills of credulity, guaranteeing himself against all other risk than that of professional reputation, by studiously sticking in practice to the uniform Narrow Gauge system both in England and France.

Before the Gauge Commissioners, while the question of the Gauge of the Oxford and Rugby, and Oxford, Worcester, and Wolverhampton lines was still undecided, Mr. Brunel continued the line of argument he had adopted before the Committees on those Bills, saying,—

4029. *If such a network of railway as has been referred to over*

England is made, I think it will be impossible that the passenger carriages can be running in all directions over that network without changing, and I do not think it would be for public advantage they should. I believe that as the number of railways extend over the country, it will become more and more impossible to send individual passengers by separate carriages to the exact place of their destination. The amount of stock required would be too enormous.

And he pressed this argument in various forms, all tending to show that the change of carriage for passengers was a necessary and increasing evil, incident to the extension of the railway system, and that, therefore, any attempt to obtain unbroken conveyance, either for goods or passengers, by a uniform Gauge, would be futile, and he recapitulated his catalogue of expedients for exchanging goods traffic between diverse Gauges.

Of the Double Gauge he spoke thus,—

There are two ways to do it—either to put two additional rails, *which is the best job*, or to put only one additional rail. The difficulty is a little increased by the longitudinal timber system.

And he says, still harping on an old theme,—

The idea of bringing all the traffic from all the different lines into London, is a mistaken notion. *The number of people who want to go directly through London is not large. With respect to goods, I do not think you would find a ton* of goods in a month going directly on from Bristol to Brighton, or from Bristol to Dover.*

Speaking of the Oxford and Rugby, a line about to intersect an agricultural district for the purpose of exchanging coal for corn, he said,—

I do not think the object to be obtained is sufficiently great to make the introduction of a pair of rails or one rail within the Broad Gauge the most economical way of doing it,—

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* If this be so, why the stout fight to run across the Thames, and join the South Western at Nine Elms?

(viz. overcoming *the break of Gauge*).

Of course the natural inference after perusing this evidence, would be, that Mr. Brunel was willing and anxious to meet the break of Gauge with his mechanical expedients, and that the Double or Mixed Gauge was one of those expensive and desperate remedies which should only be adopted in highly populous and increasingly rich districts, like that round Wolverhampton.

But it was not so. The railway public were doomed to see Mr. Brunel, within a very short period, in a round of characters—some new, some old, but all excellently performed. And, in speaking of Mr. Brunel, we speak of the Great Western Company—he being one of the three able dictators who rule the affairs of that warlike republic.

No sooner had well-applied Parliamentary influence secured the extension of the Broad Gauge to Wolverhampton and Rugby, than the "beautiful mechanical contrivances," the shifting carriage bodies, the telescopic axles, the loose boxes, and all the ingenuities passed in panoramic display before the eyes of the Recorder of Dublin, were thrown aside, and a change coming over the spirit of Mr. Brunel's dreams, the Break of Gauge which he had testified to be such a contemptible trifle at Gloucester and at Rugby grew up to most portentous dimensions. At least it is to be presumed that such was the case, for in the sessions of 1846 and 1847 we find the Mixed Gauge, which was thought too expensive between Oxford and Rugby, adopted as the universal panacea for Breaks of Gauge between cities and between villages—on trunk lines—on branch lines—in fact, wherever the Great Western was and is a competitor with a Narrow Gauge line for a traffic.

Next to Mr. Brunel stands Mr. Charles Alexander Saunders, the Secretary of the Great Western Railway, the inevitable witness in all their schemes, the advocate in print and in person of everything and anything that will increase the territories of the Company, in which he plays as prominent and versatile a part as that Lord Cardinal who wrote, not so truly as Mr. Saunders could, "*Ego et rex meus.*" Whatever Mr. Brunel proposes, Mr. Saunders carries out,—whatever, having due regard to his reputation, Mr. Brunel cautiously hints, Mr. Saunders boldly asserts. The result is, that a perusal of Mr. Saunders' evidence affords some of the most remarkable specimens of assertions, of conversions, and reconversions, that it would be possible to imagine, if we did not remember that the witness was always appearing before a different tribunal, and that his dramatic powers of assumption of all characters are of the very first order.

Mr. Saunders has followed all Mr. Brunel's chameleon-like changes, but in deeper colours, and added some effects of his own. He is now an advocate for the Double Gauge; he is the real author of the two hundred and odd miles of Double Gauge projects which have been before mentioned. He has not now the slightest doubt that the Double Gauge is the simplest and easiest arrangement possible, but he once thought quite differently, and does now sometimes in committee-rooms, where he thinks his diplomatic influence (which is of the very first order) will suffice to win the Broad Gauge extension alone without the costly incumbrance of the third narrow rail. He was once quite enamoured of a Break of Gauge, which he thought passengers rather preferred. He has given evidence this session that the Break of Gauge is a serious evil, which requires the extension of the Double Gauge or the Broad Gauge.

The Blue Book of the Oxford and Wolverhampton contests affords not a few interesting specimens of Mr. Saunders's testifying abilities.

In interviews with the Board of Trade, it had been Mr. Saunders's duty, in order to prevent a complete Narrow Gauge line of communication from being made between Birmingham, Gloucester, and Bristol, to disparage the Double or Mixed Gauge system, sneer at the difficulties of Break of Gauge, and lay great stress upon the before-mentioned mechanical expedients. Mr. Hildyard, the cross-examining counsel, being instructed of these representations, put some questions, which led to the following dialogue :—

> 12101. I do recollect; and I freely admit that I had my doubts as to the convenience and the advantages of working two Gauges in one.
>
> Q. How came you to be representing objections to the Double Gauge system when you had intimated to the Board of Trade that it was your intention to adopt it?
>
> 12105. Those interviews related to the Gauges that were to be laid down from Birmingham to Bristol, either with the Broad or Narrow Gauge. I represented *then* to Mr. Laing that it would be a violation of the engagement that the Broad Gauge should be taken up between Standish and Bristol; and that if anything was done, it must be by the addition of the Narrow Gauge. I certainly think, for that line, a *uniform Broad Gauge line* up to Birmingham better than a system of two Gauges, and said that I entertained some doubts of the convenience of working two Gauges *then*.

Mr. Saunders had previously informed the Secretary of the Board of Trade, that

> The expense of laying down the Narrow Gauge with the Broad for fifty miles, if it was merely to save the inconvenience or the expense

of shifting the goods at Rugby that may be going to Banbury or Oxford, *would be too great to make that a desirable plan*, and I told him that Mr. Brunel had satisfied my mind that other plans could be proposed that would, without any difficulty or expense to the owners, accomplish it by shifting the goods at Rugby.

These doubts, however, vanished from Mr. Saunders's mind pending the Wolverhampton inquiry, and he became convinced of the facility with which the Double Gauge in its cheapest form might be used; but the Oxford and Rugby Bill having been conceded to the Great Western with a proviso, authorizing the Board of Trade to require Narrow Gauge rails to be laid if they thought fit; he did his best to persuade the Gauge Commissioners that one of the long-promised, much talked-of, but never-practised expedients for getting over a Break of Gauge at Rugby, would be preferable to the Double Gauge, and so he shifted his ground as follows :—

3854. In the event of a double line being laid down with a Broad and Narrow Gauge, how should you be disposed to work it?

The narrow line, if it were laid down, would be for the purpose of bringing the Narrow Gauge waggons only upon the line.

And you would work the line with Broad Gauge engines?

I should think that would be the mode if forced to lay down additional rails. I think it would by third rail, *but I doubt whether it would be very much used*, and whether there would not be a more economical and better mode of meeting the case without laying down the additional rail.

You would work the Narrow Gauge carriages with a Broad Gauge engine, the line of traction not being in the centre of the line?

Yes, but I think the natural course will be to discover that there are other and better means of doing it than by laying down two Gauges.

3859. By having the Narrow Gauge laid down between Rugby and Oxford you would ensure the traffic upon your line, although it would involve the cost of extra stock?

> I question, if the object be to have a Narrow Gauge, whether it might not be as well worked by somebody else instead of the Great Western Company, and let it take its chance of having very little traffic.

This flagrant specimen of evidence *pro re nata*, as the doctors say, is only one among many of the manner in which the advocates of the exceptional Gauge support their theory.

It seems that as a means to extend uniformity of Gauge to Bristol, the Double Gauge was dangerous and of doubtful utility; but to obtain a concession of the Wolverhampton district to the Broad Gauge safe and efficient. When it was necessary to escape double expenses on the Oxford and Rugby, doubts of the efficacy of the double system again intruded themselves on the minds of the candid witnesses, even to the extent of thinking that, "if there was to be a Narrow Gauge line any one else might as well work it as the Great Western." But the Board of Trade were inexorable, and insisted on the double line to Rugby, and in the next Session another change came over the spirit of the railway conjuror's dreams, and abandoning altogether the many "*more economical* and better modes of meeting" the Break of Gauge, he proposed in every direction the adoption of the third rail, which he told the Commissioners "would not be much used."

In 1845, all Mr. Saunders's eloquence was devoted to the praise of mechanical expedients for overcoming the Break of Gauge. In 1846-7 he is dumb; he paints the horrors of Break of Gauge at Fenny Compton, at Cheltenham, at every point where Narrow Gauge lines meet his pet schemes, and, forgetting the Paddington coal-box and the telescopic axles, has only two remedies—more Broad Gauge, or the Double Gauge.

A walk through a few of the committee-rooms of the House of Commons in the month of May in this Session, would have afforded the best possible commentary on the variable opinions and unvarying policy of the two gentlemen who may be considered the incarnations of the Broad Gauge system, Messrs. Brunel and Saunders.

In committee-room 21, we find the Great Western Company promoting, on the ground of the injury of a Break of Gauge, and the advantages of competition, an extension of the Mixed Broad Gauge to Birmingham from Fenny Compton, 42 miles. In room 22, another extension of the Mixed Gauge from Stourbridge is being proposed, without a word on loose boxes or telescopic axles. Advancing to No. 25, we behold the unfairness and uselessness of competition, and the evils of a Break of Gauge, between the South Wales Line (which has two other ways to London beside the proposed Line), successfully set up against a Narrow Gauge communication between London, Cheltenham, and Gloucester. Proceeding to No. 30, we find a triangular duel going on between the Great Western, the Bristol and Exeter, and the South-Western Railway, in which the Great Western is again fiercely deprecating the principle of competition by which it had won the Oxford, Worcester, and Wolverhampton, the Oxford and Rugby, and Birmingham and Oxford Junction bills; claiming for itself *a dear Railway*, monopoly of the western communication against a cheap Railway, setting up the Breaks of Gauge at Crewkern and Ilminster, and making light of that at Salisbury, in order to exclude the Narrow Gauge Line.

Again, in the project for uniting the Great Western Railway to the Nine Elms station, the promoters *propose* to run their Broad Gauge Line parallel with the Narrow Gauge Line, from the river to Nine Elms, some five miles. In the project for joining Gloucester to Bristol by a Narrow Gauge Line, the Great Western Company *oppose*, because the Narrow Gauge promoters determine to follow the example of the Nine Elms Junction, and run parallel, instead of intermixing with an independent Broad Gauge Line.

In all these cases Mr. Brunel and Mr. Saunders are witnesses—in all, they square their evidence to the case in hand.

Now, there is something extremely extraordinary in the fact, that these gentlemen invariably hold the opinions which at the hour are most likely to obtain a victory.

Take, for instance, a resumé of Mr. Brunel's opinions:—

1838. A Break of Gauge an evil, but would not occur.

1845. A Break of Gauge an occurrence of the most trifling description, to be overcome by simple mechanical means.

1846. No evil at Gloucester, a serious evil at Fenny Compton.

1847. A serious evil wherever the Broad Gauge needs an extension. If a Narrow Gauge is likely to successfully compete, then to be cured by *the Mixed Gauge.*

Pages might be filled by recitals of similar inconsistencies. Mr. Brunel obtained leave to make the Broad Gauge by proving that a Break of Gauge could never take place, because his railway and other railways could never communicate. He obtained leave to extend his system by proving that a Break of Gauge was no manner of inconvenience either in time or money. And he has obtained leave to still further extend his system, and claims to push it on wherever he wishes, by proving that a Break of Gauge is so great an inconvenience, that to mitigate it is worth the cost of the Double Gauge. Hence it is clear that Mr. Brunel is deficient either in foresight or in truthfulness. In either case it behoves us to pause before we trust millions to his experiments, without some actual experience of his last expedient for pushing into new territories the system expressly devised for the easy gradients and flat curves between London and Exeter.

And so Mr. Saunders thought competition baneful in 1844.* Excellent between Oxford and the North, in 1845,† against Narrow Gauge Lines. Excellent, in 1846, against the cheap Narrow Gauge Line to Birmingham. Shameful against his own dear Broad Gauge Line to Exeter. In 1847, the like consistent variations; and, of course, ditto to Mr. Brunel, about the Break of Gauge and Mixed Gauge. In the whole art of evidence, the officers of the Great Western Railway Company are perfect.

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* 1844.

4148. "*You discourage the private accumulation of property in this country to invest itself in what may be justly termed great national improvements, and merely because some other persons see a case that has been successful, and say that they will do the same* for so much less, you destroy the value of that speculation, which must be the groundwork upon which this country will be eventually covered with railways for the benefit of the public."—(*5th Report Select Committee on Railways*, 1844.)

† 1845.

12033. You think benefit will result?

Yes, having COMPETING LINES I do think is a BENEFIT TO THE PUBLIC, and latterly I am inclined to think that it is a benefit to the Companies that there should be a competition; my views have been *somewhat* modified upon that subject in the last few months!!—(*Evidence before Committee on Oxford, Worcester, &c. Bills*, 1845.)

In 1845 the Irish sympathies of Mr. Recorder Shaw were enlisted in favour of the Great Western line by Mr. Charles Russell's stepping into the box at the last moment to promise a second line to Ireland by Port Dynllaen, if the Worcester and Wolverhampton project were sanctioned.* In 1846, when the Great Western were as determined on barring up a direct Narrow Gauge route between Southampton and the northern manufactures, as upon forcing a Broad Gauge competition to Birmingham, Mr. Russell again played the part of the *Deus ex machina*, and appeared before the Committee of the House of Lords with a resolution just passed wet from the ready pen of Mr. Saunders, promising, if the line were rejected, a Narrow Gauge Mixed line from Oxford to Basingstoke. The Chairman was Lord Beaumont, and, of course, this original mode of supporting a landowner's opposition was successful.

Up to the present moment, the Port Dynllaen scheme remains on the shelf of the Secretary's room, ready to bribe an Irish committee-man to grant a Broad Gauge line to Liverpool, and the promise of a Narrow Mixed Gauge to Basingstoke remains unperformed and forgotten, perhaps to be revived in the ensuing session in conjunction with a comprehensive plan for running a Broad Gauge or Mixed

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* Mr. J. Walker, C.E.—11490. I hope that the Lines which appear upon this map are not put with a view of inducing me to give evidence in favor of this scheme. If it really is not intended by the Great Western, I shall have great opportunities of bringing them to book about it.

Gauge from Southampton through Swindon to Manchester.

The fact is, that when the extension of the exceptional Gauge is in question, Mr. Brunel, Mr. Saunders, and Mr. Charles Russell seem to enter on the duty of witnesses prepared to believe anything and to promise anything; it is not, therefore, possible to put the same trust in their predictions as when they first began to prophesy.

The Gauge Commissioners were arraigned by them for ignorant corrupt partiality, because they put no faith in mechanical-shifting expedients, and yet we are not afforded one single opportunity of seeing how easily "Mr. Brunel's genius" would overleap the obstacles he has created to internal commerce by diversity of Gauge.

The truth is, that the theory of a Double Gauge is the last new shield, under cover of which the Great Western Company seek to extend their isolating exceptional Gauge into districts for which its author once pronounced it altogether unsuitable.

At this hour, no one who has taken the trouble to watch the progress of Great Western contests believes that in all the confident ingenious talk in 1845 about "telescopic axles, shifting bodies, loose boxes," &c., the Great Western Railway witnesses ever meant anything else than to get to Rugby and to Wolverhampton, and, having got there, to make the concession a fulcrum for the next demand for further extension. The Great Western are as decidedly in favour of Uniformity of Gauge as the Gauge Commissioners; but *they want a uniform Broad Gauge* to every great town in the kingdom, under the uniform control of those "grasping and grinding"* monopolists—the Great Western Directorate.

What mechanical expedients were to the Great Western Company in 1845, the Double and Mixed Gauges are

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* These are the terms which are constantly applied by the Hathertons, Russells, Muntzs, Williamses, Saunderses, and other thick and thin supporters of the Great Western Railway, to their rival the London and North-Western, not unfrequently adding praise of the patriotism and generosity of the Company they patronise, or rather which patronises them. A few facts will show what claims the Broad Gauge party have to public confidence. The Great Western Company affords the very worst railway accommodation to the labouring classes in the kingdom. The third-class trains are only those enforced by Act of Parliament—the pace, by dint of long delays at stations, is reduced to a speed barely above that required by law, viz., 12 miles an hour. It was the last Company to abandon the abominable open second-class carriages. It has tried to obtain, by a smuggled clause (accidentally discovered), the right of search for small parcels. It is, with one exception, the dearest line in the kingdom for first and second-class passengers; and, without any exception, for all descriptions of stock and goods. It charges travellers to Exeter for twenty miles of circuitous route. It is much dearer for agricultural stock (except in very large numbers) than the Norfolk and Eastern lines. A small farmer gets neither civility nor accommodation. The reduction to the level of the fares of the London and North-Western, about to take place,—the level, not below—is the purchase-money of a large slice of new territory.

The Great Western Company professes great anxiety for the welfare of the inhabitants of Birmingham, &c. This anxiety is not extended to their own territories. The people of Bath claimed a direct communication with the Wilts, Somerset, and Weymouth Railway, instead of a circuit through Box-tunnel. It was refused at first. Then, on appeal to, and pressure from, the Board of Trade, promised in 1845, but remains unmade, and without signs of preparation, to the present day. North Devon lines were allowed to drop through, while Midland Lines are pressed on. The Wilts, Somerset, &c., was only pressed when the South-Western Com-now—weapons of offence and defence, to be laid aside to rust as soon as the victory is won.

In the extreme West, whenever a Narrow Gauge is proposed, they set up vested rights and the terrors of a Break

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pany showed signs of competition. The Narrow Gauge lines to Salisbury and to Dorchester, sanctioned at the same time as the Broad Gauge lines, are open, and at work. The Manchester and Southampton line, uniting the Midland and Northern counties, through Cheltenham to that port, and intersecting an agricultural district, was opposed by these Broad Gauge Railway patriots *as landowners.* In this capacity, a Committee of the House of Lords, luckily selected, allowed the Broad Gauge chairman to appear and defeat the scheme, by producing the promise of a Double Gauge line to Basingstoke (see p. 49). The whole body of the Birmingham and Oxford Junction shareholders were refused leave to plead their own cause. But the Great Western Company are absolved from all the oridinary rules of evidence, as the Manchester and Southampton case proves. The promise remains unperformed to this day. The Directors of the Great Western know the full value of clap-trap, and make ample use of it. They do not give third-class carriages to Slough ; but they subscribe 300*l.* to the Ascot races—a cheap way of obtaining profitable popularity. In fact, on no railway is the nobleman or M.P. so sure of attention as between London and Exeter; on none is the farmer, peasant, and mechanic so much neglected, if not oppressed.

The Great Western is on terms of hostility with almost all its allies and tributaries, in consequence of the over-reaching, sharp practice which it invariably adopts. Mr. Hudson buys railways by giving them full value, and never has a dispute or a law-suit. The Great Western tries to secure added power and dividends, by thrusting subservient directors into the directorates of those companies which are so unhappy as to have its friendship. The Bristol and Exeter, the Oxford, Worcester and Wolverhampton, and the Birmingham and Oxford, are flagrant instances of double-dealing, and sharp practice.

The Bristol and Exeter is the most profitable part of the Great Western Line. But after December 1844, the separate statement of the earnings of the Bristol and Exeter was excluded from the half-yearly report, the chairman of the Great Western stating that it was not of Gauge. To outbalance low fares and third class trains, they parade their express trains, as if corn, fat cattle, and Devonshire clowns, wanted to travel at forty miles an hour. Whenever they come to a debateable land, they offer the Double Gauge, and the advantages of competition. "Good

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considered "prudent" to state what the receipts were. Then followed a provisional sale by the directors of the Bristol and Exeter, (most of them being also directors of the Great Western) to the latter company, at a price very far below the value these same directors had previously put upon it. The Shareholders all but unanimously rejected this "sell." Then the terms were raised, but still rejected; and then the Great Western projected, and are pressing a competing Line, for the purpose of crushing their late ally.

Mr. Saunders, with his usual unhesitating partizan powers of testimony, told the Yeovil and Exeter Committee, (relying on the ignorance of his judges and opponents), that this dispute originated with the Narrow Gauge party—a statement the very reverse of truth.

The Oxford, Worcester and Wolverhampton Company proved before Parliament a nine per cent. dividend, and the Directors,—tools of the Great Western,—leased to the latter Company, first at 3½ per cent.; on a cry that this was "really too bad!" raised to four per cent. Legal proceedings are pending with dissentient Shareholders.

The Birmingham and Oxford case was of the same stamp, with some variations, all exhibiting the parliamentary power,—the keen, sharp practice, and unscrupulous policy of the Great Western Company. The Broad Gauge may be the perfection of railway construction; but the history of the Great Western Company,—its promises, its performances, its tariffs, its alliances, and its law-suits, do not convey the impression of a successful experiment or of an overflowing stock of fair dealing, liberality, or patriotism. The *Examiner* once said, that if England did not take care, by French money, and by French newspapers attributing all sorts of base designs to *la perfide Albion*, England would be "*lied*" out of Spain; and we were. The Narrow Gauge party, in their passive endurance, seem likely to share the same fate at the hands of the unscrupulous noblemen and gentlemen who do the oratory and diplomacy for the Broad Gauge interest.

Heavens!" they exclaim, "would you prevent us from spending our own money? We don't seek to interrupt your Gauge, but let us lay ours down as well." Instead of attending to the counties which they chose for their exertions, eaten up by the canker of their expensive system —monster engines, express trains, half-empty carriages, and awful wear and tear—they are neglecting home to push on to the manufacturing districts.

The lines which have been sanctioned in the West remain unmade, or are made as slowly as possible—lines which should be projected are neglected in favour of schemes for running parallel with some prosperous company in search of a dividend, *alieni appetens sui profusus.* The patrons of the Broad Gauge, like Irish absentees, reserve all their liberality for strangers: while they are prepared to afford low fares, and any amount of accommodation—Broad Gauge, Mixed Gauge, and side lines—for the benefit of Warwickshire and Staffordshire strangers, they refuse common courtesy and common justice to their Somersetshire tenants.

The rankest days of political jobbing show no example of legislation more wretched—we might almost say, more corrupt—than the course pursued by Parliament on the Gauge question. If the balance of evidence—if the decision of the Board of Trade—if the Report of the Commissioners appointed to investigate the question, and "to save future contests," had been in favour of the Broad Gauge, or so much in favour of it that the unrestricted use of the two systems had been recommended—it would have been possible to understand why Parliamentary Committees are permitted to sanction Diversity of Gauge, with all its attendant evils, although no reason could have been given for their patronage of the Mixed Gauge. "But the fact is directly the reverse," it is undeniable that there are

English Engineers who adopt

A Uniform Narrow Gauge.	*A Broad Gauge.*
Mr. Barlow,	Mr. Brunel.
— G. P. Bidder,	
— Braithwaite.	
— I. K. Brunel, in Italy,	
— W. Cubitt,	
— Hawkshaw,	
— Locke,	
— Rastrick,	
— Stephenson,	
— Vignolles,	
— N. Wood.	

Government Reports in favour of

Narrow Uniform Gauge.		*Broad Gauge.*
England (2 reports, Board of Trade, 1845, Gauge Commissioners)		Ireland (5 ft. 3 in. uniform) Baden (5 ft. 3 in.)
Belgium, . .	Adopted	
France, . .	do.	
Austria, . .	do.	
Prussia, . .	do.	
Saxony, . .	do.	
Bavaria, . .	do.	
Wirtemburg; .	do.	
The Free Cities,	do.	
Tuscany, . .	do.	
Sardinian States	do.	

With this overwhelming evidence before them (to which was joined the universal testimony of all miners in favour of a uniform *Narrow* Gauge, and of all carriers in favour of a *Uniform Gauge*), two succeeding Governments professed to be agreed on the importance of no longer leaving this question to the lottery of legislation as administered by Parliamentary Committees; but while they all acknowledged the undoubted right of Railway Uniformity, they professed to be unable to find the million sterling required for reducing the Great Western line of 251 miles in length, to harmony with the rest of our railway system, the truth being, that neither the Earl of Dalhousie nor the Earl of Clarendon dared to face the compact parliamentary majority which invariably supports the Great Western Company.

Accordingly, the compromise which has before been described was concocted and embodied in resolutions unanimously adopted by both Houses of Parliament. The Act intended to carry out these resolutions was so carelessly drawn, that while the Broad Gauge, *fons et origo mali*, has been perpetuated, the question of the Gauge of future Railway Bills remains as uncertain as ever. Thus the Royal Commission of Enquiry, the Report, the solemn Resolutions of both Houses, the Act of Parliament, leave the matter just where Mr. Recorder Shaw left it in 1845, with the exception of grafting the Mixed Gauge on the Broad Gauge. Gauge contests remain, as before, to be decided by fancy, by personal friendship, by influence male or female, by the whispers of a Peer, or the approving nods of an M.P.

And in this department the influence of the Great Western Company is overwhelming; for the three gentlemen who rule the affairs of that corporation, saw early that the first element of territorial conquest was a working Parliamentary majority: to attain this end, they have applied all their powers, and with complete success. Royalty, aristocracy, and all directly or indirectly engaged in making laws, are treated with such distinguished consideration by the Great Western Company, that they can afford to despise the well-founded complaints of those below the pale of Parliamentary influence.

The high fares, the neglect of local traffic, the circuitous route, the crawling pace and wretched accommodation of its enforced cheap trains, its many failures, its many broken promises, its perpetual wrangles, suits, and sharp practising with its allies, are all pardoned, in consideration of the costly exclusive Express, and the courteous attention invariably paid to the notabilities who happen to honour its platforms.

Our financiers, and would-be financiers—our Conservatives by profession—our patriots by trade—rise nightly in either House of Parliament to deplore the waste of capital, the fatal abstraction of funds from legitimate commerce, caused by Railway enterprise. A Conservative ex-Chancellor of the Exchequer recommends stopping Railway Bills, and loans and calls, and everything likely to raise the price of Exchequer Bills; a law lord lays the price of wheat,* the potato rot, and "the large blue flies," to those abominable railways; the merchant lord, after hoarding wheat by the million quarters, writes a pamphlet attributing all our miseries to the extra consumption of bread, beef, and beer, by iron forgers and railway navigators; while the Radical popularity-hunter puts in his claim for first class carriages at third class fares; and, after these prudent and patriotic effusions, the Williamses, the Bowrings, the Goulburns, the Broughams, and the Ashburtons, agree on supporting competition and Double Gauge Railways,—that is to say, they vote first for making another Railway where one already exists, ready, willing, and able to do the work, at the cheapest possible rate; and next, they ordain that on each new Line two Railways shall be rolled into one.

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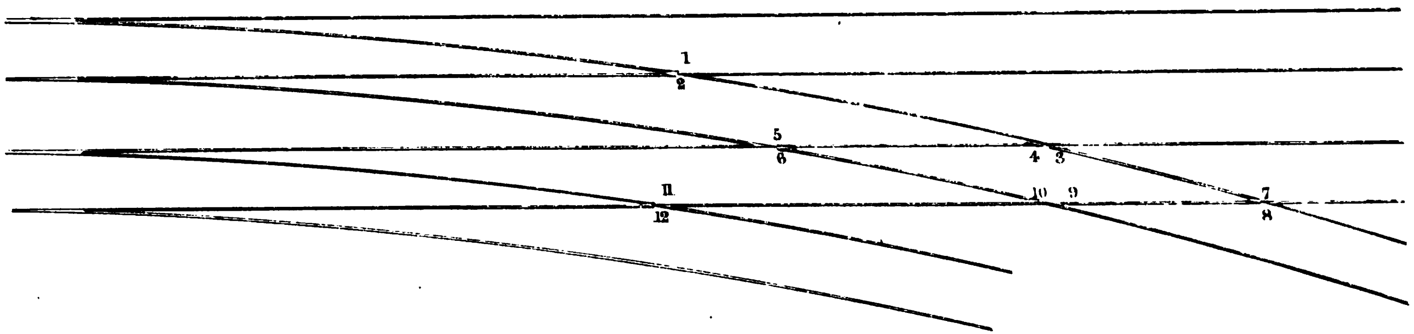
* "Who caused the price of meat and beer to rise?
Who filled the butchers' shops with large blue flies?
The French, who——" *Rejected Addresses.*

Even if the country be overflowing with capital, it would only be just that the poorer districts should be supplied before the richer have their accommodation doubled; but if capital be scarce, there are the strongest possible reasons for enforcing the cheapest modes of construction, and prohibiting competition with old Lines willing to adopt reasonable tariffs until the unsupplied districts have been traversed.

Perhaps in a few years' time, when, by universal consent, the complicated Gauge, proved to be dangerous and inefficient, is abandoned, our Peels, Barings, and Humes, will regretfully calculate what Diversity of Gauge, and the consequent compromise the Mixed Gauge, has cost, and what the sum wasted on it would have done for the revenues of the State—for the dividends of shareholders—and for the accommodation of those labouring masses, who, not rich enough to travel by express trains—nor powerful enough to be heard in Parliamentary Committees—will not always remain passive when they learn that, under the plea of affording the maximum of speed and the maximum of luxury to a select few, a selfish conspiracy has confined the many to the minimum of speed and the minimum of accommodation,—for such is the policy and the practice of the Broad Gauge Great Western Railway.

No. 1

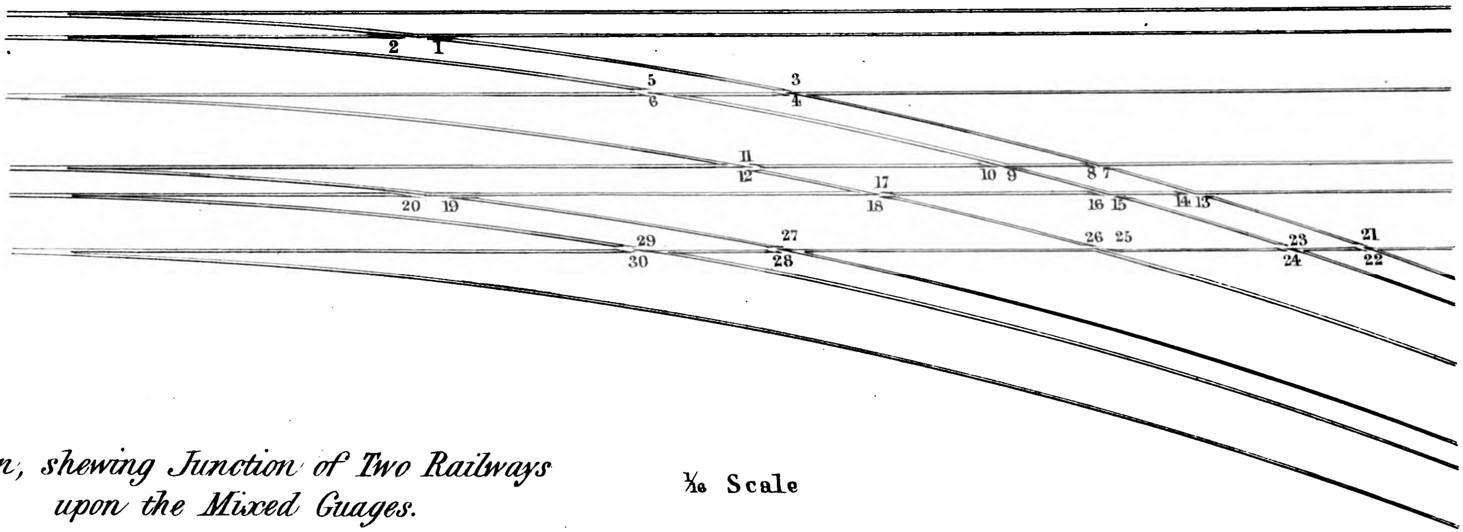


Plan; showing the Ordinary mode of Junction of Two Railways.

3/18 Scale.

Total number of places where the continuity of the rails is broken 12.

Nº 2.



Plan, shewing Junction of Two Railways
upon the Mixed Guages.

1/18 Scale

Total number of places where the continuity of the rails is broken 30